The
Electrical Review

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British Broadcasting

EMULATION is the most sincere form of flattery. Ten years of successful operation, each progressively better than its predecessor, have made British radio broadcasting the model on which the reorganisation of similar public services in all parts of the world is being based.

The British Broadcasting Corporation, whose charter cannot be renewed or modified until 1937, is a semi-State department which is uninfluenced by outside monetary considerations. Its revenue is derivable directly from the listener's pleasure, being collected as receiver licence fees by the Postmaster-General, who makes percentage grants to the B.B.C. almost *ex gratia*.

Even the best programme service would, however, be of little use if good receivers and reproducers were not available. How the enterprise of manufacturers, from which the present organisation sprang, is catering for the listening public's requirements will be fully demonstrated at the two national exhibitions organised by the Radio Manufacturers' Association, one of which opens to-day at Olympia, London, and the other in six weeks' time at the City Hall, Manchester.

An outstanding tendency of the British trade is the segregation of set owners into two main categories: those who are content with good reproduction of their local programmes and two or three European ones, obtainable with two- to four-valve sets; and those who want to range the ether for all and every transmission, which necessitates the use of more complicated multi-valve receivers. Concurrently, and invading both classes, is the growing popularity of the radio-gramophone, with its enticing "two entertainments in one" appeal.

So long as electricity is not everywhere available the demand for battery-operated receivers will continue, for it must be remembered that this type will go into both wired and unwired homes. Mains-driven sets are now several years old, but as the standard a.c. supply has not yet become so general as some sections of the trade anticipated it would, the number of d.c. mains-driven sets is at present still on the increase.

This has been encouraged by recent valve design, in which there has probably been more development lately than in any other single section of the industry. With the increase of the number and power of transmitting stations selectivity has assumed major importance, the use of band-pass filter tuners and the return to super-heterodyne circuits being marked. This has revived interest in short-wave reception, and some of the newer sets are being made to function on all three (long, medium, and short) wavebands. Nevertheless, the capabilities of straight sets incorporating all modern refinements and further possible changes in screen-grid valve characteristics should not be overlooked.

On the whole, the purchaser should obtain good value for his money. The all-metal construction was never really liked, and moulded cabinets are not as popular as they were expected to be; substitutes for beautiful woods are not easy to find.

Self-contained sets are favoured generally, the tendency being to incorporate the loudspeakers in the cabinets. Moving-coil speakers seem to be in vogue, though the price of their special magnet steel has risen. Theoretically this class of instrument should be capable of fine performance, but in practice it is seldom at its best.

Proposed Electrical Club

ONCE again the need for an electrical-meeting place in London has been brought forward. The suggestion for an electrical engineers' club advanced by Mr. R. N. Pegg in our last issue, has led several readers to express their opinions favourably in our "Correspondence" pages to-day. There is no doubt that large numbers of electrical men find themselves comparatively lost in London when the autumn and winter meetings of the societies and associations have closed down. Will the Institution of Electrical Engineers take any notice? There are many separate little lunch-hour electrical circles dotted all over London, but there is no com-

monly accepted headquarters. In our view the meeting-place required is one to which all classes of electrical men can turn whether their calling renders them professional, industrial, or trading. It is obvious that members of the Institution are looking to their own organisation to provide facilities. We would not say one word to hinder enterprise of such a kind, but we believe that success would be more probable if the door could be left open for everybody electrical, subject, of course, to reasonable conditions, to fraternise at any time. We welcome further communications.

The Act of 1882.

YESTERDAY, August 18th, was the fiftieth anniversary of the enactment of the first of the Electricity (Supply) Acts. It was a restrictive and repressive measure, and subsequent ameliorative legislation in 1888, 1899, and 1909 failed to obliterate its mischievous effects. One of its main defects was the provision that a company should be liable to purchase by the local authority at the end of twenty-one years without allowance for goodwill or profits which might have been made or anticipated. The prospects of electricity supply were then much too vague for sound investment, and private enterprise was left largely to the speculator. A statement in Parliament, reported in our pages on July 22nd, 1882, was that "of the aggregate capital of £13 or £14 million raised by the fifty-five electric lighting companies registered lately, the greater proportion had gone to inventors and promoters." The inventors' share of this total is not recorded! This Act imbued the industry with a deep mistrust of legislation—a mistrust that was extended to the constructive proposals contained in the Acts of 1919, 1922, and 1926, and still persists in many quarters.

Not So Good

THE official statistics for July relating to our electrical import and export trade do not exactly make our hearts leap for joy. As will be seen from our usual summary on a later page exports have fallen by nine per cent. in value; imports show an increase of eleven per cent.; and the previous month's advance in electrical machinery exports has not been maintained. On the other hand, when compared with the corresponding month in 1931 (since when so much has happened) import values are 49 per cent. lower, whilst there is a decrease of only 27 per cent. in exports.

Light the Gardens

WE recently visited the very beautiful private garden at "Four Winds," which is described this week, and we were reminded of many others that are worthy of floodlighting. That so little is done in private garden lighting is due to the fact that it is not generally realised that it calls for comparatively little expenditure. The man who has spent a few hundred or a modest fifty pounds on his garden and, what is more, who has given much in personal labour and time to it, is proud of it, and he will not be likely, therefore, to hesitate over the proposition for lighting it once he realises that it is not an expensive one. The equipment is particularly easy to install, and it can readily be made inconspicuous. Moreover, the garden load is a good load—in the summer time and off the peak.

"The Same Old ——!"

AMID great excitement the Chepstow Fire Brigade played upon a blazing lorry, but it was destroyed, together with part of its load of furniture. The *South Wales Weekly Argus*, in reporting the event, adopted the popular newspaper explanation of the cause: "It is believed that the fire was caused by short-circuiting of the lighting system." But the proprietors of the vehicle, Messrs. Tetlow, of Newport, answering an inquiry received from the Electrical Development Association, wrote: "*There is no evidence of short-circuiting in the electrical system causing the fire. . . . We have no idea how the fire originated.*" "It is believed" indeed! Is there any way of preventing the circulation of these harmful inaccuracies? Or have we always to be content with trying to catch up the lie with a denial? Would it not be worth while the E.D.A. sending a well-considered communication on the subject to all the newspapers and newspaper organisations?

Refuse Collection

THE battery-propelled vehicle has its limitations for road transport; these are due mainly to the relatively short distance that can be covered on one charge of the battery. This consideration does not affect refuse collection, where battery propulsion lends itself admirably to the conditions imposed by the short intervals between stops. The article we publish in this issue contains some useful powder and shot for borough electrical engineers in whose areas the sanitary departments are not yet alive to the possibilities of the battery cart. The views expressed in this article are especially valuable as coming from the chief of the Birmingham Salvage Department, who is without professional bias in favour of electricity on principle. As a result of the economies accruing from the use of battery carts, Mr. Jackson has decided to extend the fleet so that the whole of the city's refuse shall be dealt with by electricity.

A Visit to Canada

TO-DAY a party of members of the Institution of Mechanical Engineers leaves England for the visit to Canada, the hydro-electric interest of which we alluded to a few weeks ago. After inspecting many engineering and other works at Quebec and Montreal, two days will be spent at Ottawa, an act of courtesy, no doubt—or is it anticipatory gratitude?—toward the Conference still assembled there. Toronto will furnish many interesting features and the visit to the Canadian National Exhibition should leave a marked trade impression. The return journey will be made *via* the States—Rochester, Schenectady, and New York—but we hope that our British engineers will, when they reach home in September, have the determination to do their utmost to strengthen the engineering—including of course electrical—ties between the Mother Country and Canada.

Practical Co-operation

BIRMINGHAM has adopted a scheme under which a complete electrical canvass of the city and the outlying areas will be made. It is briefly recorded in our "Business Notice" pages to-day that under an agreement reached between the Electricity Supply Department and the local branch of the Electrical Contractors' Association, an experiment will be conducted for twelve months, registered contractors canvassing thirty-one city districts and six outlying areas in connection with the assisted wiring scheme. Each district is allocated to one particular member, and the Corporation will pass to that contractor inquiries and orders received from his district.

Flue-gas Dew Point

THE contribution which Mr. Vernon Walker makes to this issue should be valuable to boiler-house engineers. He describes a new way of recording the dew point temperature of flue gases, whatever their chemical composition may be. His method obviates the necessity for the use of humidity charts when making the determination, and thus renders it possible to see at a glance the temperature below which an economiser or an air heater must not be worked. The new apparatus, which is in effect an electrically heated evaporator operating in conjunction with a thyratron valve, has been developed by one of the leading instrument makers working in conjunction with a well-known firm of combustion engineers after experimenting with equipment which the author, who is assistant resident engineer at the Chamber Hall power station, Bury, devised and described in our columns in 1929.

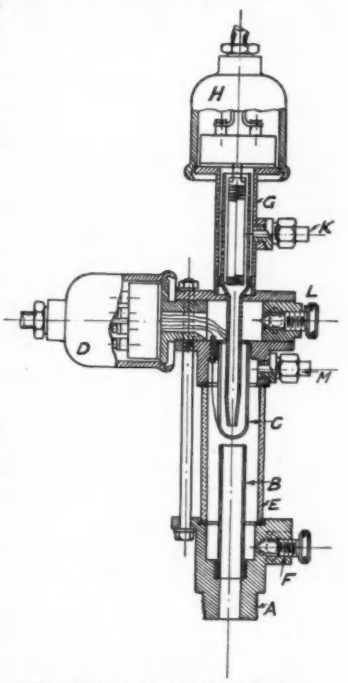
Dew Point Temperature. By Vernon Walker, A.M.I.E.E.

Some details of new recording apparatus

THE heating surface of the economiser and air heater incorporated in the modern boiler has increased, not only with the output of the units, but also with the higher extraction performance required to reduce the temperature of the gases to an economical low level. The exit gases are therefore liable to be cooled under certain operating conditions to almost boiler house temperature, and if they are allowed to cool below dew point, there will be danger of very active corrosion due to the depositing of moisture containing carbon dioxide, sulphur dioxide, and sulphuric acid.

To prevent this it is essential that the temperature at the exit of the economiser or air heater should not fall below the dew point temperature of the gases, the dew point being determined and the temperature adjusted to above this point. At the same time, it is a great advantage to be able to detect an abnormal water vapour content of the flue gases, such as that due to, say, tube leakage.

A description of apparatus for the determination of dew point with which the author was experimenting at the time was published in the ELECTRICAL REVIEW of April 12th, 1929. In this the gases were drawn by the aid of an aspirator, first through a dust filter made of wool or felt contained in one earthenware jar and then through a copper U tube placed in a second jar. In one leg of the U tube the dry bulb thermometer was placed and in the other leg the wet bulb thermometer, a slot being cut in the leg of the wet bulb thermometer to allow the wicking which was wrapped round the wet thermometer bulb to drop into water at the base of the jar. This kept the wet bulb wick moistened and the temperature of evaporation was given by the thermometer in the usual way. From the readings of the wet and dry bulb thermometers the amount of moisture per lb. of flue gas was obtained from humidity charts.



The meter unit of the recorder

The ultimate analysis of the coal being known, the lbs. of combustible per lb. of coal can be computed and this, multiplied by the moisture content as found by the dew point and by the coal used in unit time, will give the total amount of moisture in the period. By comparing this result with the lbs. of moisture in the flue gas from the air supplied for combustion, moisture in the coal, and the combustion of the hydrogen content, the leakage can be ascertained by the formula :—

$$\text{Boiler leak per cent.} = \frac{\text{lbs. of moisture observed in unit time.} - \text{lbs. of moisture accounted for in unit time.}}{\text{lbs. of steam evaporated in unit time.}}$$

An Improved Recorder

This apparatus suffered from a number of disadvantages. It was difficult to keep the filter and U tube from temperature variations. Draughts would cause moisture to be disposed on the filter and a correct reading could not then be obtained. The filter was also liable to become choked, especially if used where grit or dust was discharged.

These difficulties have been overcome by a dew point recorder which has been recently placed on the market by the Cambridge Instrument Co., Ltd., working in connection with the Underfeed Stoker Co., Ltd. This instrument records the actual temperature at which moisture will be deposited from the flue gases, whatever its chemical composition, so that no humidity charts are required for the determination. It is thus possible to see at a glance the temperature below which the economiser or an air heater must not be worked.

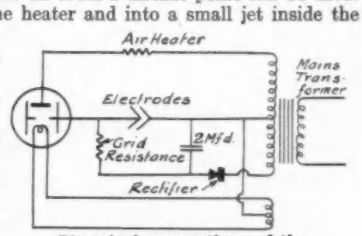
Its action depends upon the fact that a film of moisture on a glass surface makes the surface an electrical conductor. Two electrodes sealed into the glass surface are arranged in circuit with the grid of a thyratron gas-discharge valve, and when the glass surface is rendered conductive the variation of the grid potential of the thyratron causes current to flow between the anode and filament. The current is used to warm the glass surface above dew point, so that the moisture is evaporated and the thyratron grid is restored to the original potential at which no current flows in the anode circuit. The glass surface then cools and moisture is again deposited. The temperature of the glass surface thus oscillates continually about the dew point and is measured by a thermo-couple and thread recorder. The range of oscillation can be reduced to within a few degrees Fahrenheit.

Construction and Operation

The outfit consists of three main parts, the control unit, metering unit, and thread recorder. Referring to the drawing, the threaded portion A of the metering unit screws into a filter connected to the flues and the gases are drawn through the filter and along the inner glass tube B, past the end of the closed tube C and out through the cylinder E and valve F, the valve regulating the rate of flow. Over the closed end of the tube C are sealed two platinum electrodes, together with a thermo couple, which is connected to the thread recorder and registers the temperature of the tube.

When the tube is above the dew point, the resistance between the platinum electrodes is extremely high, as the tube is dry; but when the temperature reaches the dew point, moisture is deposited on the glass and a conducting path is formed. Connections are taken from the platinum wires through the terminals D to the grid and the source of grid bias of the thyratron, respectively, as shown in the other illustration. The grid bias is so adjusted that the anode current flows when the surface of C becomes conducting. A rectifier is included in the grid bias circuit of the thyratron. This is necessary because if a.c. bias is employed the capacity of the long leads which are sometimes necessary between the control and metering units will cause a large phase displacement between the anode and grid potentials.

The thyratron anode is connected to the anode voltage transformer through the air heater situated inside the cylinder G, the connection being made to terminals H. Air is drawn to the cylinder through pipe K. If the surrounding air is at a temperature near the dew point of the gas, a tube may be attached to K and cooler air from a distant point can be used. The air passes over the heater and into a small jet inside the closed tube C and out through valve L. This warm air is delivered on to the inner surface of the tube C when a current is flowing through the thyratron and heats up the surface above dew point and evaporates the moisture; the current then ceases, so that cool air is delivered and the temperature of the surface is reduced. The temperature is recorded every minute on a chart by the thread recorder.



Electrical connections of the control unit

The air and gas outlets L and F are connected to a suction which gives about 3 in. of water gauge. The a.c. mains supply anode and filament voltages for the thyratron through a transformer shown in the sketch; the same transformer also supplies the grid bias voltage through a rectifier.

It will be appreciated that a continuous record can be kept while the boilers are steaming and the temperature of the air heater or economiser gas outlet adjusted so that the dew point is never reached. Having obtained the dew point, the lb. of moisture per lb. of flue gas can be obtained from humidity charts and similar calculations can be made as described above for determining the amount of water or steam leakage.

The sensitiveness, and therefore the accuracy and reliability, of the apparatus can be determined by turning steam into the boiler setting from a soot blower while observations are made. About 4 to 5 degrees rise in dew point will represent, under normal conditions, 1 per cent. leakage. The best point at which to take the sample of gas is at the induced draught fan outlet where temperatures are as desired and mixing is thorough.

Dew point can be calculated from the volume of the flue gas and water vapour, dew point being reached when the temperature of the flue gas mixture causes the volume of gas present to coincide with the volume of water vapour. The calculated dew point can, however, be entirely vitiated by traces of sulphuric acid vapour in the gases, which may raise the dew point considerably.

Lighting the Garden

A suggestion for new business

TO visit "Four Winds," the home at Weybridge of Mr. H. H. Berry (Berry's Electric, Ltd.), and to hear his ideas pertaining to his electrical installation is to enjoy the dual experience of being in a very beautiful private garden in which, by dint of its unique splendour, one loses all sense of being in a private garden, and to become enthusiastic over the possibilities of new business for the electrical industry by way of private garden floodlighting.

Part of Mr. Berry's garden is floodlighted; but whether or not Mrs. Berry is right in her contention that the beauty is enhanced in artificial lighting, or that Mr. Berry is on safe ground in maintaining that the beauty is greater by day, one thing is certain: the floodlighting opens up possibilities which will appeal to very many private garden owners and electrical men.

The main entrance to "Four Winds," showing lodges

The Garden Scheme

"Four Winds" is situated on St. George's Hill, overlooking the Thames Valley, and it possesses about 7½ acres of cultivated and uncultivated garden in the natural environment of a belt of fir, silver birch and many other trees. Immediately in front of the reception rooms is a terraced garden sloping away from the house and circumscribed by an amphitheatre of trees which rise from the base to about 120 ft.

It is this natural layout that provides such a splendid opportunity for floodlighting. The fourth terrace from the house is a walled Dutch garden of roses with a fountain in the centre. From the fountain is fed the swimming pool about 70 ft. below the base of the amphitheatre. Alternatively the water can be diverted to terraced lily ponds, cascading over water-washed Westmorland rocks in a garden installed by H.R.H. Princess Mary at the Ideal Homes Exhibition, Olympia, several years ago. From the swimming pool the water flows to an artificial lake at a lower level, and then into a duck pond beyond, and is finally "tailraced" to the River Wey.

The owner has constructed a winding road through and around the most interesting parts of the garden, and with its severe undulations and windings it provides many a thrill to delighted and fortunate guests. The garden illuminations are simple and inexpensive. Mr. Berry has astounded many visitors by the assurance that his bill for an evening's lighting is only a few pence.

The whole installation, including both flood and strip lighting, is controlled by one main switch. Two 7/22 c.t.s. twin cables are run overhead on the trees, shrubs, and hedges, &c., one direct for the "Beeantee" strip, and the other to a watertight distribution box hidden in the shrubs for the floods. There are four 1,000-W and ten 100-W G.E.C. projectors which, with the wires, are inconspicuous. The fountain is illuminated from under the water by an h.c.p. lamp in a watertight box fitting. Electrically lighted glasshouses in such a garden is another unusual feature. As our host said: "How many owners would be glad to be able to inspect and show their friends their hothouse plants by night if they realised they could do so conveniently and economically?" Mr. Berry has found electric incubation very satisfactory.

"Four Winds" was built in 1922 and is constructed entirely of English oak in Elizabethan style, and there was no idea of making it "all-electric" at the outset. There are four reception rooms, nine bedrooms, and four bathrooms. All the fireplaces in the smaller bedrooms have been removed, and the resulting cavities utilised for housing wash-basins: in this there is an excellent suggestion for the advocates of "all-electric" homes. The larger fireplaces have been retained but modified to receive Elizabethan "Magicoal" fires. All the fires have dual control from either the door or bed, and on the equipment.

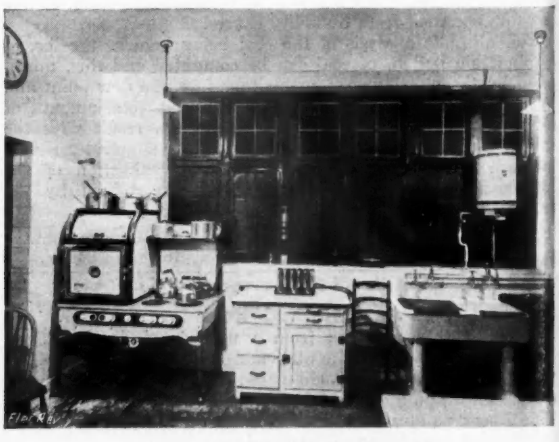
In such a house anything like modern lighting would be out of place, and there is a note of relief in the simple types of candle fittings—pendant, table and floor—and the wall and bed brackets, etc., all with their simple but pleasing parchment shades. Excellent examples of concealed lighting in the cocktail bar and glass cabinets add a note of refinement.

An All-electric Kitchen

The kitchen, of course, is "all-electric," and we saw in it a McClary table cooker (four plates), a smaller non-residence cooker, an Electrical Utilities multiple toaster, a 3-gallon "Canvary" storage water heater, and a "Kelvinator" refrigerator. One of the many evidences that economy is an underlying principal in the Berry household is the use of spirit-heated serving waggons. The saving of work and breakages resulting from these, coupled with the ease with which they can be electrically equipped and run, supports Mr. Berry's view of the importance of electric models as a link in the "all-electric" chain.

In the main entrance hall the "Magicoal" fire and a floodlighted bowl of flowers, both controlled from the door, provide an atmosphere of welcome. The owner has very strong ideas on the importance of fire control from the door, compatible with suitable tariffs. Lighting under similar conditions is used very freely and almost regardless of consumption. Of course no electrical man would expect to find a "Perry" heating installation without hot-water basic heating, and a few concealed convertors suggested to us a certain discreetness. The back of a fire installed in an adjacent room projecting into a cupboard affords another useful suggestion for utility. The instigator of this combined system advocates the general basic heating to about 55 deg. F., with electric local radiant heating; "against such a system gas has not got a chance." He claims that by varying the proportions of local and basic heating the system can be economical with electricity at 2d. per kWh.

In the garage another indication of economical running is an electrically driven air compressor used for spray-painting the cars "at home," while a synchronous clock over the entrance arch is evidence of the desire to make the installation "all-electric." Heating, cooking, lighting and garden illuminating are metered separately. The total loading is about 65 kW, and the over-all running cost is roughly £120 per annum.



Some of the kitchen equipment

We expressed our view that many electrical men would enjoy the experience that we had, and Mr. Berry said that the grounds would be illuminated until the middle of September and visitors would be welcomed upon presentation of a card at the Lodge.

" Four Winds," Weybridge—the Home and Garden of Mr. Herbert H. Berry

1. The house; 2. Floodlighted amphitheatre; 3. Find the projectors!; 4. Entrance hall with floodlighted flowers and fire; 5 and 6. Swimming pool by night and by day; 7. Architecture and fire in harmony; 8. Illuminated foliage.

Electric Vehicles at Birmingham. By Jas. Jackson, O.B.E.

Notes on their use for refuse collection derived from practical experience

ONE of the most important statutory duties of local authorities is the removal of house refuse, a service which costs the ratepayers of England and Wales over £5,000,000 per annum. The annual cost of this work in Birmingham, with its area of 51,153 acres and population of 1,002,413, amounts to about £132,644, and the question of the type of transport to be employed has received close attention over a long period. Until 1918 the whole of the refuse collection transport service was performed by horse-drawn vehicles, but in that year the working hours of manual employés of the Birmingham Corporation were reduced from fifty-four to forty-seven per week. This reduction in hours made imperative the consideration of employing a faster type of traction in order to minimise increases in working costs.

Electric or Petrol Vehicles?

After carefully considering the claims of petrol and electrically propelled transport, it was decided that the latter class of vehicle should be introduced. The work of refuse collection is probably one of the most severe duties which any mechanical vehicle can be called upon to perform, having regard to the necessity for great reliability, constant stopping and starting when collecting from house to house, variation in weights of loads (amounting in each collection area to a difference of over 60 per cent. at varying seasons of the year). The electric vehicle appeared to possess the necessary qualifications to the greatest degree.

A further important consideration in favour of the "electric" was that a source of the motive power could be cheaply and conveniently obtained by utilising the heat produced from the burning of house refuse.

The first electric was put into commission in 1918; to-day there are 124 vehicles in service, the fleet comprising twenty-four 2-tonners, thirty-one 2.5-tonners, thirty-four 3.5-tonners, three 4-tonners, and thirty-two 5-tonners.

The initial decision in favour of electrics has never been regretted, and the Birmingham Salvage Committee has now decided that electric vehicles shall be substituted for the remaining forty horses.

Consistent Cost-Reduction

With the increased employment of electric vehicles, the refuse collection costs of the city over a period of eleven years have shown almost consistent reductions. The most reliable unit figure for purposes of comparison is the cost per 1,000 premises visited, and the reduction effected in this cost from the year ended March 31st, 1922, as compared with March 31st, 1932, represents an annual saving of £53,173.

The cost per 1,000 premises visited has fallen from £728 to £519, per 1,000 population from £154 to £132, and per ton from 11s. 6d. to 8s. 9½d. The refuse collected by electrics was 175,880 tons last year, or 73.25 per cent. of the whole, a figure which is steadily increasing.

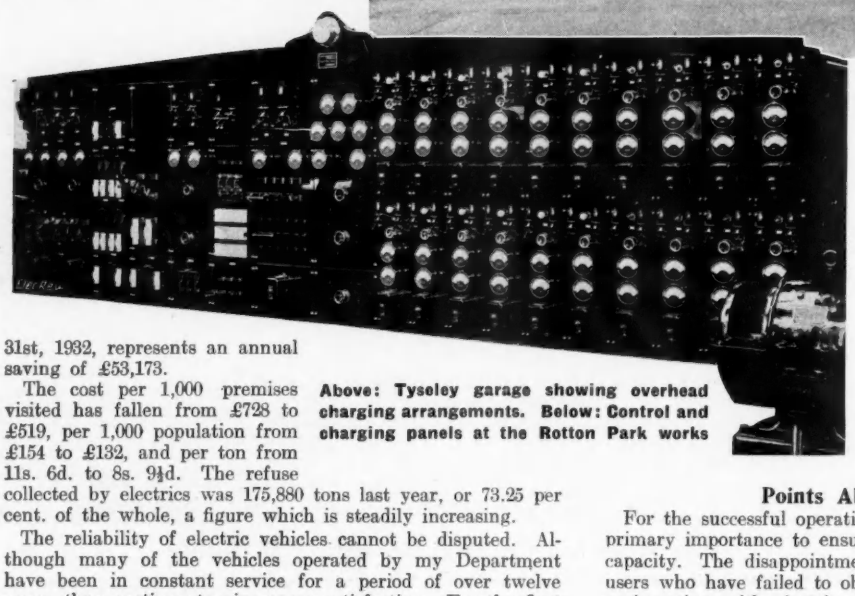
The reliability of electric vehicles cannot be disputed. Although many of the vehicles operated by my Department have been in constant service for a period of over twelve years, they continue to give every satisfaction. For the fleet as a whole, a running efficiency of 91.94 per cent. was obtained during the year ended March 31st, 1932, but in calculating this efficiency, time lost for all reasons, including painting, repairs, battery renewals, &c., is taken into consideration.

A 2-ton refuse-collecting vehicle

In practice nine vehicles are reserved as spares for replacing vehicles temporarily taken off the roads, so that actually an efficiency of 100 per cent. is obtained from the regular fleet.

The number of days lost during the year was 2,669¼, or 8.06 per cent., for the following reasons: Running repairs, 3.59 per cent.; spare (vehicles not required), 2.08 per cent.; painting, 0.97 per cent.; wheelwright's repairs, 0.65 per cent.; battery overhaul, 0.54 per cent.; accidents, 0.22 per cent.; and miscellaneous, 0.01 per cent.

The experience of other large municipal users of electric vehicles, including the Cleansing Departments of the Blackpool, Nottingham, Sheffield, and Glasgow Corporations, confirms the reliability of these vehicles, and the following record of the length of service of electrics operating in New York City is not without interest: 2,899 over seven years; 1,580 over ten years; 156 over fifteen years; and 25 over twenty years.



Above: Tyseley garage showing overhead charging arrangements. Below: Control and charging panels at the Rotton Park works

Working Costs

During recent years the Department has standardised vehicles having a capacity of 3½ and 2 tons, and the schedules on the next page show the working costs for last year of eighteen of these vehicles, which, incidentally, were all supplied by one maker and some of them were purchased during the year.

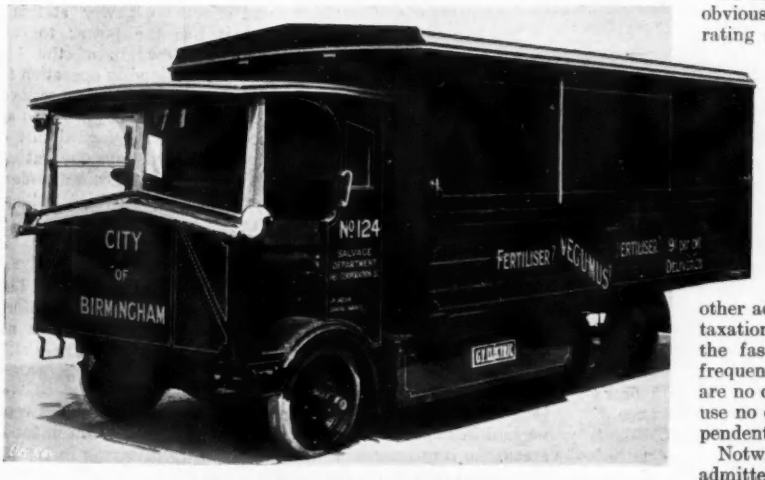
Points About Batteries

For the successful operation of electric vehicles it is of primary importance to ensure that batteries are of sufficient capacity. The disappointments experienced by a number of users who have failed to obtain satisfactory results after experimenting with electrics can be traced to neglect of this elementary requirement. In their desire to restrict the purchase prices of electrics, particularly in order to meet the competition of the frequently lower priced petrol lorry, electric vehicle makers have sometimes in the past included batteries

of insufficient capacity, and in my own Department I have considered it advisable in a number of instances to increase original battery capacities when renewing them. It should be remembered that lead-plate traction batteries are guaranteed for a period of three years by all reputable makers, so that a battery of ample capacity can be obtained at a comparatively small increased annual cost.

SERVICE DATA.	TEN 3½-TON VEHICLES. Totals.	EIGHT 2-TON VEHICLES. Totals.
No. of loaders employed in addition to driver	2	1
Days worked	2,188.6	2,335.5
Journeys	6,090	6,624
Loads	6,090	6,624
Miles run	25,428.2	19,742.7
Weight carried (tons)	14,949.5	10,102.7
Average loaded mileage, per journey	2·087	1.49
Energy used (kWh)	51,646	33,249
KWh per mile	2·031	1.68
Premises visited	547,792	527,742
RUNNING CHARGES.	£ s. d.	£ s. d.
Wages (driver only)	1,136 13 4	1,213 3 2
Tyres	22 18 9	23 14 11
Electrical energy at .75d. per kWh	161 7 10	103 18 1
Garage expenses and sundries	303 7 6	239 8 8
Repairs and renewals	83 17 0	229 0 8
Total running charges	£1,708 4 5 (=2s. 3.42d. per ton)	£1,809 5 6 (=3s. 6.98d. per ton)
STANDING CHARGES.		
Depreciation	880 14 10	600 6 0
Proportion of tax and licence	183 15 0	108 0 0
Insurance	40 10 0	43 4 0
	£1,104 19 10 (=1s. 5.74d. per ton)	£751 10 0 (=1s. 5.85d. per ton)
Total exclusive of loaders' wages	2,813 4 3	2,560 15 6
Loaders' wages and bonus	2,699 7 8	1,326 4 10
	£5,512 11 11	£3,887 0 4
Tools and materials	58 7 4	35 2 10
Overhead charges	775 14 8	551 8 7
Grand total	£6,346 13 11 (=8s. 5.89d. per ton)	£4,473 11 9 (=8s. 10.27d. per ton)
Cost per 1,000 visits	£11 11 8.63	£8 9 6.44

At the present time the average actual life of batteries used in this Department approximates to the guaranteed period of three years, although one type of battery, installed in fifty vehicles, has an average life of two months longer. The daily mileage of all vehicles varies from seven to twenty-six, with an average of 13.7 miles. The capacities of batteries now installed in the various classes of vehicles are from 225 to 256 Ah for 2-tonners, 280 to 370 Ah for 2.5-tonners, 355 to 384 Ah for 3.5-tonners, and 387 to 464 Ah for 5-tonners.



A 3½-ton vehicle with sliding covers

My Department generates electrical energy from the burning of house refuse, and full advantage is taken of this; practically all the electrical energy required for works power, lighting, and canteen purposes, in addition to the charging of vehicle batteries, is produced by the Department.

The following table shows the cost of generating electricity at four of the Department's works during last year. If this energy had been purchased from the Electric Supply Department the additional cost for the year would have amounted to £3,284.

Depot.	Total Expenses (including depreciation or loan charges).	Quantity generated (kWh). Works power.	Charging.	Total.	Cost per kWh.
	£ s. d.	kWh.	kWh.	kWh.	d.
Montague Street	1,554 13 11	388,965	226,347	615,312	0.606
Brookvale Road	1,100 4 1	238,791	203,336	442,127	0.597
Tyseley	925 6 9	68,097	256,205	324,302	0.685
Lifford	655 13 7	109,947	111,638	221,585	0.71
Total	£4,235 18 4	805,800	797,526	1,603,326	0.634

Power is generated at 440 V d.c. for works use, and this supply is split up into four 110-V legs by means of five-wire balancers for battery-charging purposes.

Training the Staff

In the re-organisation of any public transport undertaking involving a change-over from horse to mechanical traction, the training of drivers is a matter of considerable importance. It is obviously against the policy of any municipality to discharge a large number of regular employés and to introduce new men capable of undertaking the duties required. In this Department the difficulty is overcome by selecting the most suitable men from the horse-wagon staff, who are invited to attend a series of lecture classes at which they are taught the essential details of the vehicles they will be required to drive.

Mr. Jas. Jackson is the general manager of the City of Birmingham Salvage Department

During each course of lectures practical demonstrations are also given of the driving signals approved for use by the police and vehicle drivers, and on completion of the course an examination is held, those men obtaining the requisite number of marks for a pass being selected for subsequent training in practical driving. At the present time the Department is in the fortunate position of possessing a driver and deputy driver for practically every vehicle, and it has never been necessary to import a driver from outside the Department's ranks.

So far as garage attendants are concerned, it is obvious that, having regard to the expensive generating and charging plant in use, men possessing some technical knowledge are necessary for this work, and it has been found that ex-naval men having engine-room experience develop into satisfactory garage hands.

Why Electrics are Best

I am satisfied that electric vehicles possess advantages over other types of transport, when employed on work for which they are suited. In addition to their reliability and long working life, other advantages are lower insurance rates charged; taxation is at one-half petrol-vehicle rate; they are the fastest vehicles obtainable on work entailing frequent stops and starts; they are clean and there are no obnoxious gases; they are quiet in operation; use no energy or fuel when standing; and are independent of foreign fuel.

Notwithstanding these advantages, it has to be admitted that the development of the electric vehicle in this country has proved disappointing to its many advocates, although one reads that the American Railway Express Company is operating no fewer than 1,800 electric vehicles.

It is an anomaly that many electricity supply authorities do not themselves appreciate the advantages of the electric over the petrol vehicle for local transport work, and it is suggested that these authorities have the power to popularise further the type of transport in which they should be most interested by themselves employing electric vehicles and by quoting favourable rates for battery charging which, incidentally, normally takés place at night-time when the demand for electricity is at its minimum.

Impregnation Oil for H.P. Cables

In a recent article in the *Bulletin Technique* of the Société de la Maille raye (France) on the subject of the oils used for impregnating the insulating paper of armoured cables, it is pointed out that it is essential for such oils to have properties that will ensure reliable and long-life cables. In order that the impregnation shall be thorough the fluidity of the oil must be as high as possible for working temperatures between 120 and 140 deg. C. On the other hand, the oil should be of low and fairly constant fluidity when the temperatures are between 10 and 60 deg. C. in order to prevent any flow of oil in such parts of the cable as are not horizontal.

The Growth of the Grid

The present position and its effect on electricity supply

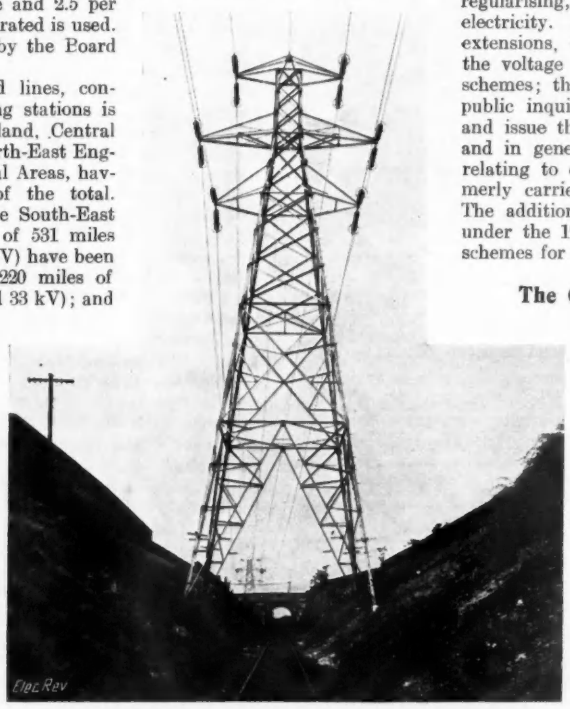
WE have presented information to our readers from time to time relating to the design of the Regional Schemes for the grid, the selection of stations, the progress in constructing the interconnecting network, and the work of the Central Electricity Board generally.

The position to date is that nine Schemes have been adopted covering the whole of England and Scotland, with the exception of North Scotland, in which only 1.8 per cent. of the population of Great Britain live and 2.5 per cent. of the total electricity generated is used. Stations selected for operation by the Board number 135.

The construction of overhead lines, connecting cables, and transforming stations is complete in the Central Scotland, Central England, Mid-East England, North-East England, and East England Regional Areas, having a population of two-fifths of the total. Schemes still incomplete are the South-East England, where 444 miles out of 531 miles of primary lines (mostly at 132 kV) have been erected, and 170 miles out of 220 miles of secondary lines (mostly at 66 and 33 kV); and North-West England with 300 out of 313 miles of primary and 156 miles out of 238 secondary completed; while in South-West England and South Scotland good progress is being made.

Date of Completion

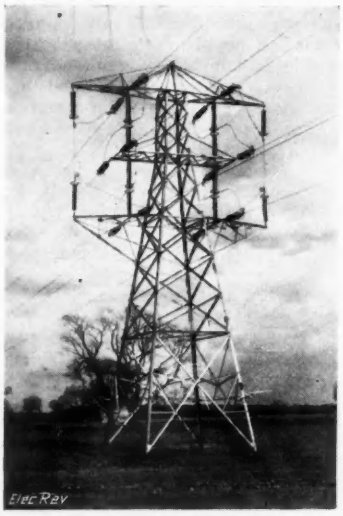
Omitting South Scotland, it may be said that the programme of primary construction is now finished with the exception of the two regions touching upon the south coast; the completed portion accounts for nearly 75 per cent. of the 4,062 miles of overhead line (2,917 at 132 kV) and the accompanying transformer stations.



An overhead line along the railway near St. Helens

We give on the opposite page a map of the grid as it is to-day; gaps between sections still physically isolated, pending completion of construction, have been bridged over so as to present a complete picture. The whole grid, with upwards of 250 supply points, is expected to be in operation by this time next year.

So far the C.E.B. has not been on an operation basis, its attention having been devoted to the consideration of schemes, the choice of stations for retention, the construction of the grid, the standardisation of frequency, and the giving of temporary supplies in advance of grid operation.



A transposition tower carrying the Norton-Dunston 132-kV lines

The last - named activity has already been instrumental in enabling the expenditure of large capital sums on new generating plant in obsolete stations to be avoided.

Common Queries

The frequent inquiries we receive from our readers show that some further information of quite a different character is required. These inquiries indicate that outside the supply section of the industry a large proportion of those connected in some way or other with electricity are uncertain as to what the upshot of it all is likely to be. What effect will the grid have upon the retail cost of electricity to the consumer? Will connection of a town supply with the grid further the sale of electrical apparatus? Will distribution voltages and frequencies be standardised? Many of our correspondents have clearly very little knowledge of the organisation of the industry; that is, perhaps, hardly surprising in the circumstances.

In the first place the Central Electricity Board is often confused with the Electricity Commission. The Commissioners are members of a Government department—the Ministry of Transport. They were appointed under the Act of 1919—long before the grid was thought of, officially—for promoting, regularising, and supervising the supply of electricity. They sanction generating plant extensions, overhead line construction, and the voltage and frequency of new supply schemes; they confirm Special Orders, hold public inquiries on various matters, collate and issue the only comprehensive statistics, and in general perform most of the duties relating to electricity supply that were formerly carried out by the Board of Trade. The additional duty was placed upon them under the 1926 Act of preparing technical schemes for the Central Electricity Board.

The C.E.B. and Its Duties

The Central Electricity Board is a public corporation and not a Government department. It is somewhat akin, in effect, to a large bulk supply power company, but its directors are appointed by the Minister of Transport. It is also permitted to call for a Government guarantee (as to principal and interest) on any loans raised, but it has found it possible to borrow all the capital it requires without exercising this right.

The Board does not generate and owns no power stations, but it has the power to call upon the owners of the 135 stations retained in operation to run these stations at prescribed loads and when required, so as to obtain the greatest working economy having regard to the needs of the country as a whole. The Board buys the output from all these stations and sells it to the 665 authorised undertakings. For this purpose it is establishing the high voltage network referred to above.

Effect on Retail Prices

An important point to bear in mind is that the Board has no powers to distribute to the consumer. It may therefore be said that, theoretically, a grid connection will have no direct bearing on the retail charges for electricity. These still fall within the exclusive province of the supply authorities.

Moreover, in some areas production costs are now so low that no reduction in rates are to be expected from a grid connection in the near future. But we believe that, even in these areas, the consumer will ultimately gain from saving in capital charges on stand-by plant rendered unnecessary owing to interconnection.

In areas that are not so fortunately situated the price of grid supply should often be very much below the cost of local generation, and, while there is no legal obligation on the undertakings to pass on the difference to the consumers, public opinion, if not commercial acumen, will no doubt result in this being done. Supplies will also be more readily available where none now exist as undertakings will not fear to start to distribute in sparsely populated areas if they are handicapped by the capital charges on generating plant during the early stages. As we see the position, it is that while marked reduction in retail charges for electricity is not to be looked for everywhere in the immediate future, they will ultimately be lower generally than they would without the grid.

A change of frequency to 50 cycles per second can be required by the Board only if the change is necessary for its operations. In practice this will mean that areas served by selected stations will have their frequencies standardised at the cost of the Board. What happens in other areas will depend upon the supply undertakings, who will bear the cost.

The adoption of the standard distribution voltage of 400/230 V 3-phase a.c. is required by the Electricity Commissioners for new supply areas; existing authorities are under no obligation to change their systems, but many are doing so.

THE
MAIN GRID
SHOWING THE POSITION TO DATE
Scale of Miles
0 20 40 60 80 100
REFERENCE :-
Primary Stations
Secondary Stations
132 Kilovolt Transformer Stations
Hydro-electric Stations
Principal Main Transmission Lines
Boundaries of Areas
Transmission Lines not owned by CEB
IRISH SEA
ROSS & CROMARTY
NAIRN
MORAY
INVERNESS
PERTH
FORFAR
KINCARDINE
ABERDEEN
ARGYLL
DUNBARTON
RENFREW
GLASGOW
EDINBURGH
BERWICK
KILMARNOCK
SELKIRK
ROXBURGH
DUMFRIES
Kendoon
Carsfad
Earlstoun
Glenlee
Dumfries
Torpoint
ISLE OF MAN
Douglas
DURHAM
Norton
DARLINGTON
Whitby
Scarborough
YORKSHIRE
LEEDS
HULL
Grimsby
Skegness
LINCOLN
ANGLESEY
CARNARVON
MERIONETH
FLINT
DENBIGH
MONTGOMERY
RADNOR
BRECKNOCK
CARDIGAN
PEMBROKE
CARMARTHEN
GLAMORGAN
LEICESTER
NORTHAMPTON
HUNTINGDON
NORFOLK
SUFFOLK
ESSEX
SURREY
KENT
WILTS
SOMERSET
DEVON
DORSET
SOUTHAMPTON
Dover
Calais
Boulogne

Notes on E.H.P. Switchgear. By A. M. Spruce, A.Am.I.E.E.

The metal-clad type in outdoor service

WHEN duplicate bus-bars are supplied on indoor metal-clad switchgear, with only one circuit breaker per feeder, the different methods adopted for changing over from one set of bars to the other are as follows :—

1. Rotating circuit breaker contacts in which one set of contacts rotates through 180 degrees and make connection with either the main or reserve bars. 2. Transfer method of selection, where oil switches in the isolated position can be moved backwards or forwards and raised to make contact with the selected bars. 3. Twin circuit breaker, in which two distinct breaker movements having a common centre contact are mounted in the same tank. 4. Separate oil-immersed selector switches interlocked with the circuit breakers. 5. Two entirely separate circuit breakers, one for each set of bars.

The employment of schemes 1 to 4 result in a complicated switching unit, which in some cases does not permit the change-over from one set of bars to the other without first breaking the circuit. Scheme 5 enables the change-over to be safely effected under load without interruption of service. Units with duplicate circuit breakers are more expensive than equipments with only one breaker, but the additional expense is often justified. Should this type of gear become standardised its cost should come down.

For outdoor installations of the metal-clad type, duplicate circuit breakers have generally been used with vertical isolation, although indoor units of the horizontal draw-out pattern have, in some places, been installed out of doors with a semi-enclosed covering for protection against the weather, but the latter arrangement is of limited application only.

Constructional Features

The majority of outdoor metal-clad units so far designed have the bus-bars, connections and connection joints solidly insulated, in addition to having the compartment filled with an insulating medium, usually oil. The oil serves to increase the dielectric strength of the insulation round the conductors, and provides a better medium than compound for the transference of heat from the conductor to the outside metal, resulting in a considerable saving in copper. A factor of safety for the operating staff and the system is obtained which is seldom equalled in other types of switching equipment.

The various compartments are built distinctly from each other, and are provided with drain valves so that the oil may be drained away without affecting operation. In order to provide for oil expansion and to maintain the level inside the compartments, oil conservators are fixed above the units. Special sealing ends are provided for the incoming and outgoing cables; these are equipped with oil-tight bushings to prevent the oil leaking into the cables

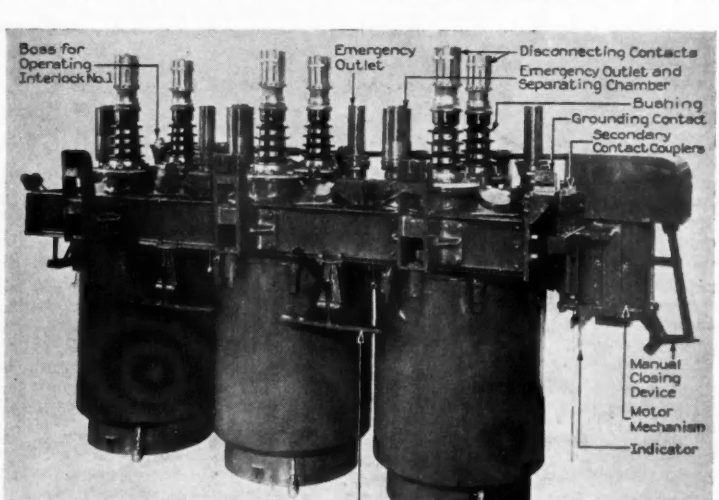
Provision is usually made in the top connecting pipes to accommodate cables entering either at the left- or right-hand side of the units. At one end of the connecting pipes flexible expansion joints are provided to take up any pipe expansion or contraction and so relieve all joints and compartments from undue strain.

The oil circuit breakers may be lowered vertically for test or inspection to a position midway between operating and completely disconnected positions, with the bushings entirely withdrawn from the shells and leaving no live parts exposed. In the test position the secondary control wiring is not broken, so that the breaker can be operated from the control board, but on complete disconnection the control circuits automatically open. This method of isolating the breakers results in a simple arrangement, as disconnecting switches are entirely eliminated, and effective interlocks are provided to guard against inadvertent switching operations.

The round type of tank is common with the majority of English and foreign manufacturers for use on medium and high rupturing capacity circuit breakers, both for indoor as well as outdoor metal-clad gear, as it is claimed that this type is usually more cheaply fabricated than the rectangular type; less metal is required to withstand the same internal pressure, and more accurately machined joints on the top flanges (to prevent oil throw) are obtainable.

The circuit breakers are raised or lowered by means of a motor-operated elevator, which is mounted on rails and situated on a transfer truck. The latter is capable of moving the whole length of the switchgear, running either on rails sunk in the ground, or underslung from the girders supporting the units, and individual tank-lowering mechanism is dispensed with. The elevating platform is controlled from the truck, and a limit switch prevents overtravel in either the transverse or vertical directions.

To secure the breaker to the supporting structure when in the operating position, one manufacturer employs combination guide and supporting bars which are suspended from the breaker housing. This arrangement is locked or released by a single operation, and reduces the time taken to withdraw a circuit breaker, as no nuts and bolts have to be removed. The breaker shown was made by the American G.E.C.



An oil circuit breaker for metal-clad switchgear—side view

Interlocking Arrangements

Complete interlocking of the circuit breakers and their associated operations, either mechanically or electrically, is arranged to protect against faulty switching. The interlocks provided by one maker are: 1. A mechanical interlock to prevent the operation of locking bars which secure the breaker in its operating position when it is closed. 2. An electrical interlock to prevent switching unless the breaker is in either the operating or test position. 3. A mechanical interlock to prevent access to the tank-bolt nuts when the breaker is in the operating position, and to prevent tank removal except from the test position. 4. A mechanical interlock to provide against raising the breaker to the operating position while it is closed.

Provision is always made on this type of switchgear (as on indoor metal-clad units) for testing the cables and earthing the line before inspection or repairs are carried out; interlocks between the earthing switches and breaker prevent opening or earthing the main circuit while on load. In the main connections between the incoming cables and circuit breaker a change-over switch is included, which may either be in the normal position or in the earthing and test position.

Supporting Structures

The main supporting structure for outdoor metal-clad switchgear is fabricated from standard mild-steel rolled sections, providing maximum strength with minimum weight. The vertical columns are usually single-member joists, but braced channels have been used in some cases. Rigidity of the complete structure is essential, and, with channel columns, diagonal bracing across the bays may be necessary to take up any longitudinal forces.

Where possible, complete sections such as columns, and transverse and longitudinal girders are completely riveted or welded at the manufacturer's works before despatching to site, in order to reduce field bolting and time of erection. For the foundations, small concrete blocks slightly larger in surface area than the bases of the columns, and so proportioned as to give safe bearing pressures, are generally all that are required. The wind pressure on exposed surfaces of such structures, will produce comparatively small overturning moments, as the column centres are large.

Access to all the apparatus is obtained by means of ladders extending from the ground level to the top of the structure, and horizontal grill-type platforms above the units running the complete length of the installation.

The Radio Exhibition

Some receivers and components that will be on view

THIS is broadcast radio's tenth successful year. The National Radio Exhibition opens at Olympia to-day, just a month earlier than has been customary in the past.

Features of this year's exhibits include better selectivity, more superheterodyne receivers, and considerable modification of price lists.

Among the new loudspeakers is one of considerable interest which is to be marketed by Slekton Products, Ltd., at a modest price. It is an open secret that Mr. P. K. Turner has been working since 1927 (lately in collaboration with Mr. H. A. Hartley) to produce a moving-coil loudspeaker free from the defects often found in these instruments. He is now satisfied that this object is attained, and the Hartley-Turner Standard speaker is now in production. The new speaker has an effective frequency range of 60 to 9,000 cycles with no perceptible resonances. Further, although it is more sensitive than most loudspeakers, it can handle the full output of a 25-watt valve (*i.e.*, about 5 watts of audio-frequency power). If these claims are well founded the new instrument will represent a real advance in reproducer technique.

The British Thomson-Houston Co., Ltd., is devoting its stand entirely to gramophone motors. The new "Truspeed" turntable for a.c. supply with automatic stop mechanism weighs only 6 lb. 8 oz. and consumes only 6 to 8 watts. The "Universal" motor turntable will operate on either d.c. or a.c. supply from 100 to 250 volts and 25 to 60 cycle frequency.

The B.T.-H. "Minor" pick-up and tone-arm (moulded) and the "Golden-Disc" model with a B.T.-H. "Senior" demonstrate the operation of the automatic stop mechanism. During the exhibition music will be supplied for the dance floor from B.T.-H. sound amplifying equipment.

The new models of the General Electric Co., Ltd., were reviewed last month. The a.c. radio-gramophone has a high torque motor. The mains driven superhet. receiver is equally efficient on long and short waves, while the "Viking" a.c. model does not make use of reaction at all and its selectivity and quality are good. Band-pass filters are incorporated and variable-mu intermediate amplification, with horizontal calibrated wave-length station indicators. Accessories include new loudspeakers and valves for reception and transmission.

Ferranti, Ltd., are maintaining their whole range of audio, output, and push-pull transformers without modification, except the AF10, which is now provided with moulded bobbins, and all their mains transformers in future will be provided with terminal panels, with the exception of type SV4, which is specified particularly for use with band-pass constructors' sets. A tunable hum-removing condenser, a new smoothing choke, type B10, and a new range of fixed wire-wound resistances have been made available, and a new triple-gang tuning condenser with slow motion dial is being sold as a separate component. This component is completely shielded, and its actual capacity is 0.000437 maximum and 0.000026 minimum. An unusual feature is a non-microphonic mounting base. It is accurate within 0.00000075 mfd. at maximum and 0.000000125 mfd. at minimum capacity, and it is, we believe, the only condenser which is supplied accurately adjusted in the first case, although trimmers are provided to enable it to be adjusted to individual coils by the constructor.

A new type of cheap moving-coil speaker, known as the M4, with a built-in output transformer, will be shown and a new d.c. energised moving-coil speaker, type D3, will also be included, with a new inductor speaker, suitable for use with all types of ordinary sets, whether powerful or otherwise.

The R.I. short wave adaptor amplifier

A new model of the 7-valve band-pass superhet. console receiver has a synchronous electric clock let into the speaker grill and a new development is a low-priced screened-grid three kit. Other items are Ferranti valves, push-pull amplifiers, and measuring instruments.

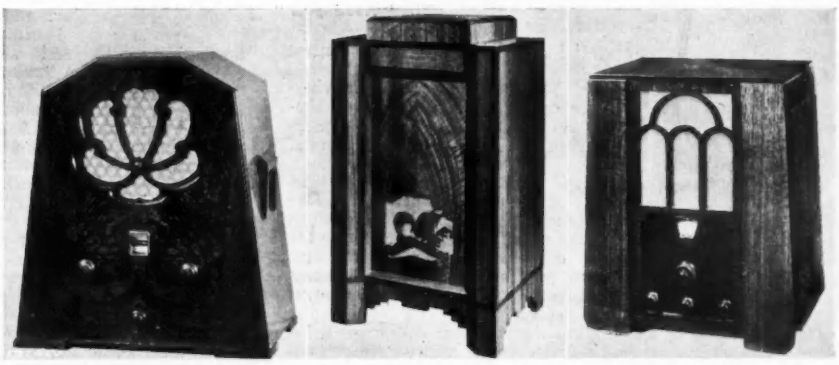
Kolster-Brandes, Ltd., have at least three new sets, all a.c., with electro-dynamic moving-coil speakers. The 3-valve set will take plug-in coils for short waves of 25 to 75 metres. The powerful 6-valve superhet. covers three ranges from 2,100 down to 16 metres with provision for mains-aerial reception. The 4-valve set will also receive short waves, and has means of altering the reproduction tone, and reducing high-frequency interference. Screened-grid valves are used and gramophone jacks are provided. A radio-gram. and battery sets are amongst other models. Cabinets are of better quality and appearance and prices have been modified. The new receivers are sensitive and selective with good tones. The gramophone equipment comprises an a.c. induction motor with 12-in. turntable, tone and volume controls, and a high-grade moving-coil speaker. The new moulded "Bakelite" tracking arm is arranged to compensate for the weight of the pick-up and gives an average output of 0.8 volt.

The Kolster-Brandes model 286 superheterodyne receiver

The Fuller Accumulator Co., Ltd., displays five ranges of dry batteries. The 120-volt type F25 is an addition; the "Sparta" is improved in appearance by the new "all-over" attractive cover, which takes the place of the old box with lid and sealing band. There are new types of portable set batteries which incorporate tapped grid-bias sections, and new g.b. types are of 9 and 16.5 volts.

The accumulators on view include "non-spill" jellied acid models for portable sets. For valve filament heating the "Mammoth" plate types are improved by fitting slotted connector grips and other types have been modified.

Practically all existing Varley (Oliver Pell Control, Ltd.) components are being retained. New ones are wire-wound volume controllers, oscillator and intermediate-frequency coils, a pentode impedance matching transformer, and a new "Rectatone" transformer for frequency compensation in l.f. amplifiers. The new receivers include three 5-valve superhets., *viz.*, cabinet, consolette, and radio-gramophone models; also an a.c. 3-valve mains set which incorporates "square peak" tuning and a moving-coil speaker.



A new Ferranti superheterodyne model, the Varley "square peak" consolette, and an R.I. three-valve receiver

The radio portion of the gramophone is a 5-valve superheterodyne and the low-frequency end of the set is specially designed to compensate for high note loss. The controls are housed in a recess at the side of the cabinet and do not protrude. A large moving-coil loudspeaker is in the base of the cabinet and a Varley pick-up is in the centre of the top board, the Garrard synchronous motor being silent in use and fitted with an automatic stop.

Each new instrument of L. McMichael, Ltd., is fitted with the "duplex" easy tuning arrangement. When the wave-change switch is operated a pointer attached to it moves to the appropriate scale automatically. Both the portable models, of the suit-case and cabinet varieties, are automatically grid biased, so dispensing with the small battery usually needed for this purpose. The 4-valve transportable set is a.c. mains driven, has a self-contained frame aerial, and a mains-energised moving-coil speaker, the cabinet being mounted on a turntable. Battery sets are included as well as a.c. and d.c. radio-gramophones, while the "Colonial" receiver for long, medium, and short waves does not use plug-in coils.

The Chloride Electrical Storage Co., Ltd., amongst filament and anode accumulators, including unspillable cells, displays 10-volt units assembled in batteries of 60 volts and fitted in polished wood crates of special design with ends shaped to facilitate stacking, thereby saving floor space.

Component parts illustrate the construction and technical features of "Exide" cells.

A novel feature of this year's exhibit is a new range of torch cases which marks the culmination of the development of "Drydex" batteries and cells for all purposes; fountain pen torches are also shown as well as cycle lamps. One of the

novelties on the stand is a dry cell battery type gas lighter.

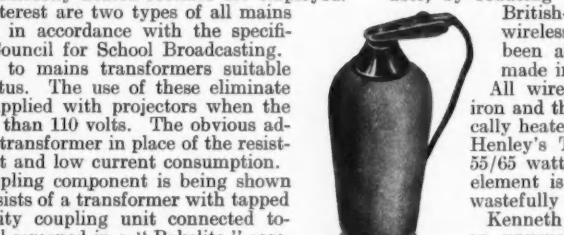
The new all-mains superhet. table model of Radio Instruments, Ltd., employs six valves, including rectifier, four of which are effective amplifying stages. Band-pass tuning is incorporated in both the pre-selector stage and the intermediate coupling circuits.

An electrically excited moving-coil speaker is fitted to an internal baffle board, specially supported to avoid cabinet vibration. The new 3-valve "Madrigal" table model receiver is of similar design; three indirectly heated valves, including a pentode, and a full-wave indirectly heated rectifier are employed.

Exhibits of special interest are two types of all mains receivers manufactured in accordance with the specification of the Central Council for School Broadcasting.

Prominence is given to mains transformers suitable for home talkie apparatus. The use of these eliminate the large resistances supplied with projectors when the mains voltage is higher than 110 volts. The obvious advantages of the use of a transformer in place of the resistance are absence of heat and low current consumption.

The "Parafeed" coupling component is being shown for the first time; it consists of a transformer with tapped resistance and a capacity coupling unit connected together, completely metal screened in a "Bakelite" case. The resistance-capacity unit is completely isolated from the transformer. Eight terminals are provided so that every known arrangement of parafeed circuits can be employed.



The "Avodapter"

Brownie Wireless Co. (of Great Britain) Ltd., has a powerful "Dominion" receiver which employs screened-grid, detector, pentode, and rectifying mains valves and incorporates a special selectivity and volume control for varying locations.

Ganged condensers, matched screened coils, and a moving-coil speaker are built into the cabinet, while two aerial tappings also are provided, and terminals for gramophone pick-up and extra loudspeaker. A similar battery set is of all-metal chassis construction.

The Gramophone Co., Ltd., is exhibiting for the first time at Olympia. A special model of the new 10-valve automatic record-changing superheterodyne radio-gramophone is built in a glass cabinet with a glass motorboard; the instruments shown comprise seventeen different models. The first "H.M.V." battery "superhet. portable six" excites interest and a new all-mains 7-valve superheterodyne chassis is shown in two forms with moving-coil loudspeakers.

The equipment of an 80 station instrument comprises a 10-valve superheterodyne radio-gramophone incorporating variable-mu valves and new type automatic record changing mechanism which plays eight records consecutively, repeats a single record indefinitely, or can be used as an ordinary gramophone with the mechanism cut out of action.

The "Transportable Radiogram" and the "De Luxe Radio Four" both incorporate band-pass tuning, single dial control, and moving-coil loudspeakers.

The Igranic Electric Co., Ltd., is introducing many new lines in its extensive range of components. For instance, a screened dual wave coil has a change switch incorporated. There are mains transformers, variable condensers, chokes, and a tapped choke capacity output unit in "Bakelite" case, designed to be arranged for the choke to act as an auto-transformer, giving either "step up" or "step down" effect to suit the particular type of loudspeaker.

With the logarithmic type wire wound variable volume control suitable for use with variable-mu valves the graded resistance, in effect, obeys the same law as the valve, so that the position of the control knob from maximum volume downwards bears a direct relationship to the volume of sound, *e.g.*, half rotation would give half volume.

Other interesting lines exhibited include "Midget," "Parvo" and "Acme" transformers, fixed and variable resistances of all sizes, jacks, lugs and switches, l.f. chokes, short wave components, pick-ups; also a range of amplifiers for public address work, together with attendant microphones, projector speakers, &c.

The Automatic Coil Winder & Electrical Equipment Co., Ltd., is showing "Douglas" and "Macadic" hand and power driven coil winding machines. Also a new "Avometer" which is universal in that it affords not only all the d.c. voltage, current, and resistance ranges of the older model, but also four ranges for a.c. measurements, the accuracy being B.S. first-grade at 50 cycles. Another new item is the "Avodapter," which consists of a plug, instantly convertible for four or five pin valves. The plug is inserted in the valve holder in the set, the valve under test being plugged into the base of the "Avodapter." A switch is provided to enable anode, screen, and grid currents to be measured without change of connections, and (simultaneously or separately) filament or heater, screen, and anode voltages may be determined.

E. K. Cole, Ltd., has new a.c. console and a.c. and d.c. consolettes which use patented superhet. 5-valve circuits, band-pass tuning, and built-in moving-coil speakers. These instruments are housed in "Bakelite" cabinets and select stations by name. Radio-gramophones and the 4-valve table receiver are devoid of complicated controls and the 3-valve set has a balanced-armature speaker. All are mains driven, a.c. or d.c., and the company's battery eliminators and trickle chargers are too well-known to need comment.

Messrs. McLeod & McLeod announce that they are now able, by reducing the cost of tools, to supply good quality British-made cellulose-acetate bobbins for all wireless purposes at lower prices than they have been able to import them hitherto. They are made in all sizes and shapes.

All wireless constructors should have a soldering iron and their attention is directed to the new electrically heated iron just placed on the market by W. T. Henley's Telegraph Works Co., Ltd. It consumes 55/65 watts, the secret of its success being that the element is right inside the bit, so that heat is not wastefully dissipated.

Kenneth Brooks (Radio & Television), Ltd., has an unusual super-het. employing double band-pass tuning and eight tuned circuits with single knob control. Having pre-set the tuner for nine favourite stations, each can be heard by simply pressing a button. This "Zetavox" device does not interfere with ordinary dial tuning.

The Edison Swan Electric Co., Ltd., is featuring the cathode-ray oscillograph and a range of batteries in dust and short-circuit proof covers as well as four groups of accumulators. There are R.K. loudspeakers, a.c. and d.c. models, each with a 10-inch corrugated cone and a moving coil of 15 ohms nominal impedance. The a.c. model embodies a Westinghouse metal rectifier and others have permanent magnets. Gramophone pick-ups, tone arms, and output transformers are also shown.

The Westinghouse Brake & Saxby Signal Co., Ltd., has a new series of copper oxide rectifiers giving larger outputs, up to 120 mA at 500 V for anode circuits, and 2 A at 6 V and 1 A at 12 V for filaments. A new photo-electric cell rectifier and various instrument types are included, while for battery charging purposes there are four new "correct rate" multi-circuit sets. One three-circuit outfit which is being demonstrated will charge from one to fifty cells at 0.5, 1, and 3 A.

F. C. Heayberd & Co.'s mains units are displayed both assembled and in kits of parts for the amateur to build his own eliminator. Neatly mounted plugs and sockets with variable resistance knobs are arranged on a "Bakelite" panel recessed into the top of the unit. Westinghouse rectification is employed with double core chokes, safety fuses, and alternative output switches. For portable receivers there are units which incorporate trickle chargers, also d.c. mains kits, transformers and other accessories.

Siemens Electric Lamps & Supplies, Ltd., have one of the largest stands devoted to an all dry battery display. They have been making dry cells at Woolwich for sixty years. One of the principal features is the one-piece (seamless) zinc cell used exclusively in "Full O'Power" batteries, of which there are four distinct radio types, including the reliable "Super-Power" and the new inexpensive "Cadet" of good performance. Other items are pocket and torch batteries and the recently introduced "Full O'Power" dry cell, which is ingeniously contrived. Also a selection of high-class testing instruments are worthy of inspection.

The "Solon" soldering iron

The British Broadcasting Corporation's exhibits include as usual a 1.5-kW valve amplifier for feeding in common all the loudspeakers on exhibitors' stands.

The General Post Office demonstrates the manner in which different kinds of electrical devices and apparatus in common use can interfere with broadcast reception, and also preventive measures which can be taken by their users to remedy such nuisance.

For the first time receiving licences will be on sale at the show. The total number in use in July last was 4,800,000, an increase of one million during the past twelve months.

It has unfortunately been necessary to prosecute a steady average of five "pirates" per day.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Consumers' Suggestions Invited

With reference to your invitation for suggestions for the improvement of domestic electrical apparatus in the ELECTRICAL REVIEW of August 5th, I forward the following comment.

I have some of the usual utensils in use at home—table lamp, toaster, &c., but the housewife's objection to these portable appliances (an objection which prevents the greater use of electricity) is that the flex has to lay curled up on the carpet and occasionally trips up anyone who passes between the table and wall socket.

I know there are flush floor sockets, but one cannot cut a carpet for access to them. Ceiling suspension sockets, as made by Messrs. Crabtree, have the disadvantage of appearance of festoons when more than one outlet is needed, besides not being flexible for any point of the room; unkinkable flex, as made by Messrs. Callender, does not solve the problem.

What is needed is a flat (and possible armoured) flex, not more than ⅛ in. thick, which would not cause any obstruction to traffic passing over it.

Wembley, *August 10th.* N. J. DAWSON.

You invite consumers' suggestions for publication in your columns, and as a consumer I respond.

Some time ago I suggested in the ELECTRICAL REVIEW that there was an opening for a silver-buffing outfit, with a fractional-h.p. motor; there was no response. I then sent on the idea to my old firm, who replied that the matter would be brought to the notice of the head on his return from abroad; but he failed to either take it up or damn it and made no reply. So one might assume that the 200,000 or 300,000 housewives who cannot get their silver kept properly clean by modern maids are content, whereas in actual fact they send it to the bank.

Another requirement is a cord grip which can be attached to an ordinary plug for use with vacuum cleaners, to prevent the perpetual fracture of the flexible; most plug-sockets have no cord grip at all, and are still of the utterly absurd sort which can be pulled out by the cord.

Chichester, *August 10th.* J. W. MEARES.

Lighting from Power Points

In the "Correspondence" pages of your current issue Mr. Wittey inquires as to methods of checking the fradulent use of power for lighting purposes.

Will he, or another reader, tell me if it is practicable, when fitting installations, to incorporate a load switch—that is, a switch that closes the circuit fully when the current drawn exceeds, say, 1 amp., and brings in a resistance if the current falls below this figure?

The resistance, of course, would be such as to cut the potential down to an unusable figure.

There probably are stumbling blocks to this suggestion and I shall be glad to hear of them, as I have often wondered if this idea could be used, but have had very little experience in commercial undertakings.

Catford, *August 12th.* C. F. GAGE.

Single-phase Meters

From an article on "Single-phase Meters" published in your issue of August 12th one gathers the general impression throughout the argument that meters in general are full of defects, but it concludes with admiration of the manufacturers who do not change their products.

A number of the comments and criticisms require reply as early as possible.

(1) The tendency in meter design to reduce overall weight and size is manifestly the acme of good engineering.

(2) It is essential for gas meters to have the glass window protected by a metal door, because the breakage of glass in a gas meter may mean the loss of a consumer by death, whereas happily in the case of an electricity meter no poison escapes.

(3) The use of a metal cover over the coin slot of a prepayment meter is only necessary when the mechanism of the meter is otherwise exposed to the entrance of dust and dirt. Even then the use of this cover is inadvisable in a way, because it is a temptation to the consumer to insert dust deliberately if he sees that a cover has been fitted to prevent it.

(4) Complaint is made of magnetic material adhering to the brake magnet, and the suggestion is that a wider gap would reduce the trouble. A better way to reduce the trouble is to eliminate it altogether by refraining from using magnetic screws in the construction of the meter; rivets are preferable for this very reason.

(5) Criticism is made of finely cut gear teeth, on account of the wear, but surely the wear in a meter is not comparable with that of a watch in which very much finer gears are used.

(6) The importance of external influences is much exaggerated, although it is admitted that the proportion of dishonest consumers is small. It should be realised that no dishonest consumer is likely to increase the speed of his meter deliberately, and if he reduces the speed by leaving the magnet in position he is liable to be found out and punished when the meter reader discovers it.

(7) The number of spare parts required for modern electricity meters is so small that standardisation from that point of view is quite a secondary consideration.

FERRANTI, LTD.
R. H. Schofield,
Hollinwood, *August 12th.* *General Sales Manager.*

I have to-day received a letter from Messrs. Ferranti in response to my article published last week on "Single Phase Meters." They also enclosed a copy of a letter which they have forwarded to you for inclusion in your next edition. I accordingly attach hereto my reply to their remarks:—

"(1) To reduce the overall weight and size of meters, I agree, is the acme of good engineering, but it can be overdone as it is to-day.

"(2) All gas meter windows are not protected by a metal door. I suggest it is a good method of preventing window breakages.

"(3) Dust does find its way into prepayment meters through the coin inlet and it should be the manufacturers' duty to prevent it. That the fitting of a cover is inadvisable because it is a temptation to the consumer to insert dust deliberately if he sees that a cover has been fitted to prevent it I regard as most improbable.

"(4) I am sorry if I gave the impression that only by using a wider air gap could filing trouble be reduced. Rivets may be preferable, but in dismantling a meter they can be a nuisance.

"(5) That the wear in a meter is not comparable with that in a watch I agree, but it should be noted that the driving element of a watch is much greater than that of a meter.

"(6) I do not think any consumer having sufficient intelligence to utilise a magnet to reduce the speed of his meter would be so foolish as to leave it in position for a meter reader to discover it. I am doubtful if the consumer was discovered doing this whether he could be successfully prosecuted. I think Messrs. Ferranti much underrate the intelligence of consumers, though probably their experience in this direction is limited.

"(7) The number of spare parts for one particular type of meter may be small, but it is considerable for several makes of meters and several types."

Southampton, *August 15th.* W. P. TRENHALL.

Double Tariff Prepayment Meters

The expression "double tariff" is attractive enough to rouse the interest of any consumer, especially if he is told that by increasing his load he considerably reduces the price per kWh at which he is charged. But is this type of meter equally attractive to the supply authorities? The wise consumer will reduce the period during which he consumes in order to reach a higher maximum load during the period of consumption, and as his period of consumption is likely to coincide with that of many other consumers, the result will be that a fairly high peak will be produced, considerably overloading the station.

The idea of using a two-rate (double-tariff) meter is very good provided the supply authorities can control the time of changing over from one rate to another by means of a time switch. A double-tariff prepayment meter with self-contained synchronous time-switch would just do the trick.

London, S.E.23, *August 15th.* F. C. Z. CROSSE.

Our Poor Publicity

Much as such a heading is to be deplored, especially when appearing in the columns of a leading journal devoted to the interests of the electrical trade such as the ELECTRICAL REVIEW, the astounding fact remains that some of our publicity is distinctly poor.

In your issue of August 5th Mr. Alex. C. Cramb, as the chief spokesman of the E.D.A., adversely criticised the decision of the public lighting authorities of the City of Westminster to extend the contracts for gas lighting in certain streets for so long a period of fifteen years, and mentioned that gas lighting on the sea front and on certain streets of Scarborough had been recently replaced by electric lighting.

Surely E.D.A. knows the reason for this tardy change from gas to electricity at Scarborough, which is possibly the last place on earth to have used gas on its sea front where electricity has been available for many years. The electricity undertaking was only comparatively recently purchased by the Corporation, the previous company not having done up to that time any public lighting of importance, if any at all—and certainly not any on the sea front, whereas the gas undertaking has been all along publicly owned.

Is it to be wondered at, even here, that the new administrators should at last decide to adopt on their sea front a system of lighting that could not be extinguished by the high

winds so common on this coast? Filey and Bridlington, also in Yorkshire, have for many years used electricity for illuminating their sea fronts, notwithstanding the existing and older gas interests, which I believe are also owned by those corporations.

Why go out of London for the purpose of comment or comparison, when the lighting of London streets is in question? Surely there are ample opportunities available in London for comparing ancient and modern systems of street lighting from which really relevant and useful deductions could be made!

The new lighting in Piccadilly Circus was briefly mentioned by Mr. Cramb. What a pity it was that he did not refer to the important fact, especially at this juncture, that some of these lighting points were until recently gas points.

Go from here along Piccadilly as far as Albemarle Street, which is lighted by gas, and then to Hyde Park Corner, where the electric lighting has recently been vastly improved after experiments extending over some considerable time.

Piccadilly is every bit as famous as Regent Street, which is only a shopping centre and is practically deserted at night. Piccadilly is Clubland and frequented by people who mean something in the country's affairs and are accustomed to and expect the best of everything. This is possibly the reason why that particular stretch of Piccadilly is electrically lighted!

Another instance of recent improvement in electric street lighting is to be found in Tottenham Court Road, which is, however, handicapped by continuing the use of the existing lamp-posts, which originally carried arc lamps.

One must not lose sight of the fact that improvements have recently been made in the gas lighting in important London streets, such as in New Oxford Street and further west along the Bayswater Road, and in the southern districts of London.

Another instance of what appears to be poor publicity is given in your issue of August 12th under the heading "Rural Activities," relating to the inauguration of electricity supply at Cuddington in the Aylesbury area. An exhibition of electrical fittings and utensils was held most appropriately at this time, but, what attracted my attention far more than any of the electrical exhibits shown in the photograph which you published was the oil lamp hanging in the centre of the schoolroom, and the entire absence of any electrical fitting to give general lighting!

London, W.1, *August 13th.* F. RISCH.

"The Curse of Parochialism"

As an act of courtesy to a friend of well over fifty years' standing and an erstwhile colleague at various times, I feel that I should notice the letter from Mr. E. G. Pink in your issue of August 12th; but not to answer it.

Mr. Pink makes a number of statements without adducing proof; in my judgment they are incapable of proof. Mr. Pink and I have exchanged views on the subject at great length. My conclusion is that we start from widely different premises; ergo, no agreement is likely, argue we never so long and wisely.

As the majority of those concerned with the electricity supply industry condemn the "parochial" constitution imposed by the original Electric Lighting Acts, it is superfluous to explain the phrase to your readers.

Streatham, S.W.16, *August 13th.* HENRY M. SAYERS.

Suggested Electrical Engineers' Club

The subject of Mr. Reginald Pegg's letter in your current issue should find ready support of a sufficient magnitude to justify the formation and development of an Electrical Engineers' Club in London.

It would appear that a far-reaching advantage would accrue to all I.E.E. members were the Council of the Institution to take this matter up seriously either as a separate concern or, alternatively, as something to be incorporated in its present constitution.

As a provincial member of the I.E.E. I have pleasure in supporting Mr. Pegg's suggestion that such a club would be very desirable, if not much more so than any new kind of "Temple" for the holding of meetings and the housing of the Library, and I sincerely hope that your readers will do all they can to assist in the development of the proposal.

Seaton, Devon, *August 15th.* P. O. WITTEY.

I read with interest Mr. Pegg's proposal regarding the inauguration of an Engineers' Club under the auspices of the I.E.E.

This departure, which would be extremely welcome to most of us, would mean the forgathering of members in congenial surroundings, where the knotty problems which we all meet at times could be discussed and unravelled.

Provincial towns have their Engineers' Clubs, why not the Great Metropolis?

Beckenham, *August 15th.* R. G. MIDDLEMISS, A.M.I.E.E.

I have great pleasure in supporting Mr. Pegg's proposal.

The I.E.E. may not be handsome outside, but it may be made comfortable inside. There does not appear to be any reason for spending a large sum of money to build on a new site while there is considerable accommodation on the existing site, now vacant.

I do not know if it is appreciated that the I.E.E. building is of almost no use to the country membership, which probably exceeds the London and District membership very considerably. Unless one is actually attending a meeting at the I.E.E. it is not possible to obtain even a cup of tea while chatting with a friend, while the possibility of having luncheon at the I.E.E. has not been dreamed of. It cannot be said that space is not available—there are those vacant rooms!

It appears to me that, failing considerably increased facilities, so that country members can really enjoy the I.E.E. on the occasions when they come to town, there should be a very substantial reduction in the subscription of country members. Personally, I would rather have the facilities than save the money.

Northwich, *August 15th.* W. FENNELL.

With regard to Mr. Reginald Pegg's letter in your issue of August 12th I should be glad for my name to be included as a supporter of the suggestion.

London, W.1. RICHARD H. A. DEANE, A.M.I.E.E.
August 16th.

The E.T.B.I. Festival

I shall be very grateful if I may be allowed to inform your readers that it has been decided to alter completely the form of our Annual Festivals.

Instead of the usual banquet at which an appeal for financial support was made, and which was followed by a dance, it has been decided that in future the Festival shall be *entirely a social function*, and that this year the function shall take the form of a ball, supper and cabaret.

It is proposed to hold the Ball at Grosvenor House, Park Lane, on Friday, November 18th, the price of the tickets being £1 1s. each.

London, W.C.1, *August 12th.* J. T. KEEPING,
Secretary,
Electrical Trades Benevolent Institution.

Kanthal

With reference to the article "A New Electrical Resistance Alloy" appearing under "New Apparatus and Devices" in your issue of August 12th, dealing with Kanthal used in connection with elements in electric furnaces, we should like to say that we have a furnace installed in our demonstration hardening shop at this address.

We shall be very pleased to show this furnace in operation to any of your readers who may be interested.

WILD-BARFIELD ELECTRIC FURNACES, LTD.,
North Road, Holloway, N.7, E. P. Barfield.
August 13th. Managing Director.

Electricity on the Poultry Farm

Electrically lighted brooders for rearing chicks have now been available on the market for many years and probably more brooders of this type than of any other are in practical use in England to-day.

For many years I was prejudiced against their employment, especially as at the time night club life did not seem to me to be quite the thing with which to start off young chicks in this world. However, as the method was demonstrated by others to be most successful, I reared two lots of very healthy chicks with them last season, on a solid and not a netting floor.

One important advantage of a light in the brooder chamber is that it causes the birds to collect in the middle instead of crowding into the corners. In the latter case they are apt to perspire, catch cold and a number die off.

There seems to be an analogy in the all-night lighting of full-grown hens, *i.e.*, birds in their second year of laying. It has now been proved that such birds will lay as many eggs as the first year pullets. All-night lighting of the pullets, however, is a disadvantage as the number of eggs drops off, but if their hours of feeding are made up to 14 per day, *i.e.*, electric light used for any hours of darkness exceeding ten, these young birds will lay 15 to 25 per cent. more eggs in the winter time when eggs are most valuable. The cost of such lighting only amounts to the value of one egg per bird per season.

Where mica wound elements working at a black heat are employed for brooders, it seems advantageous to cover as large an area as possible of the roof of the brooder with the heating wire, and it is preferable that the surface protecting the wire should be non-dust collecting. Electric black heat brooders are, of course, quite successful, but I thought it right to point out that the luminous ones are equally, if not more, successful.

An entirely new system of electric brooding has been developed employing Ferranti "Parabolic" type heaters. In this case there is no protecting cover for the chicks, which is an entirely new practice. The chicks are collected under the heater by means of wooden framing and the temperature adjusted by the height of the radiator above the chicks. As the minimum wattage of these radiators is comparatively high, they can only be economically used on a large flock of chicks. Time, however, is required to test the effectiveness of such an entirely novel method of rearing chicks.

Greater Felcourt, *August 16th.* R. BORLASE MATTHEWS.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Electric Clocks

SMITH'S ENGLISH CLOCKS, LTD., 179-185, Great Portland Street, W.1, are making a range of small synchronous electric clocks for mounting on the front panels of wireless sets. Three models are at present available. One—a 3½ in. circular dial type—is provided with a special bayonet fixing arrangement so that the dial can lie almost flush with the face of the cabinet.

Other new lines recently produced by this company are the clock-lights and a grandfather clock with a "secret store."

There are three clock-lights—the "Burnhamlite," including the "Burnham" clock with a fancy shade (selling at £3 10s.); the "Clocklite," a model finished in chromium and black enamel for office, study or bedside use, and priced at 4 guineas; and the "Cliftonlite," a lamp fitted with a "Clifton" type clock, priced at £4 15s.

The "Pretoria" grandfather clock

The new grandfather clock, the "Pretoria," is 6 ft. 3in. high, and comprises a bookcase and a wine cupboard; its price is 14 guineas.

Another model is a master frequency control clock, which can be used for time-controlling the frequency of an a.c. supply. Provision has been made for the automatic reception of broadcast time signals by a wireless set incorporated.

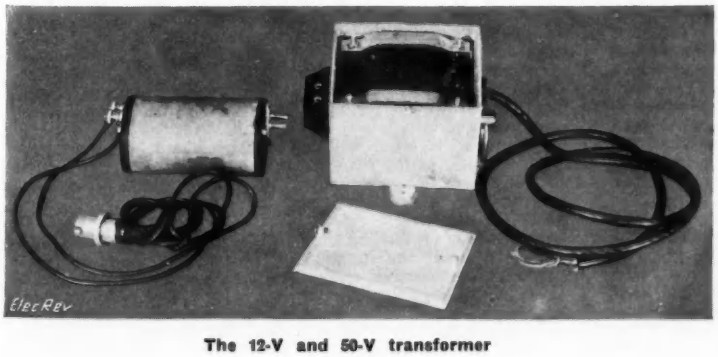
This set is kept permanently tuned in and can be set to come into operation at any hour or half-hour at which time signals are sent out. Two minutes before the pre-selected hour, the wireless programme will be heard on a loudspeaker, followed by the time signal and two minutes further programme, at the end of which the set is automatically switched off.

The clock itself is a "Smith-Synchronome" master frequency clock of the latest free pendulum type, the pendulum deriving its power from a small 4-V battery trickle charged from the mains: Greenwich time is recorded by the small dial on the left, and frequency time by the dial on its right. Both times are also shown on the two large dials, the upper dial having a red hand.

The Modulator

Considerable economies in heating systems are effected by a new British electrical invention—the "Modulator," supplied by the MAGNETIC VALVE CO., LTD., 43, Bloomsbury Square, W.C.1. It makes possible the circulation of water through different sections of a heating system at various temperatures from the same boiler system. Thus adjustments may be made to suit the different aspects of a building, the temperature being regulated by multiple thermostats fixed either in the main flow pipe to the various sections of the heating system or in a typical room in the section of the building concerned.

In principal the device consists of a series of magnetic valves in one body. Usually there are three connections, one from the boiler, one to the heating system, and one from the return from the heating system. The latter connection closes when the main flow opens and *vice versa*. When the temperature of circulating water falls below that desired, one or more of the ports in the "Modulator" opens according to the thermostats' settings.



The 12-V and 50-V transformer

New Safety Switches

The latest products to be manufactured by MESSRS. VICTOR H. IDDON, LTD., 27, Blackfriars Street, Manchester, are an all-insulated combined switch-lampholder and a pear switch.

The switch lampholder embodies a special type of circular waterproof cord grip, and is equipped with a long skirt conforming with Home Office suggestions. Although the switch has a quick make and break action there is very little movement of the push-bar. The trade price is 22s. 2d. a dozen.

The pear suspension switch incorporates the same switch movement, but has a special cord grip designed to prevent pressure where both leads are in contact with each other, the pressure being applied to each lead separately against the central projection by the screw-on casing. These switches cost 12s. a dozen (trade price).

The "Nettle" switch-socket and pear switch

Torch for Tourists

The "Hike-lite," which is made by the EDISON SWAN ELECTRIC CO., LTD., 155, Charing Cross Rd., W.C.1, is of interest to motorists and farmers as well as scouts and "hikers." This torch projects a beam of light 300 ft., and can be used either as a handlamp or adapted as a reading lamp; it incorporates a number of new features, including a day-and-night all-point compass, which is fixed at the top of the torch between the bulb and the bevelled plate-glass lens.

A hinged metal cover protects the lens from breakage, whilst the hinge pin also carries a metal loop for fastening the torch to the belt or fixing inside a car. Fitted inside the cover is a mirror for shaving or general use.

Other features are a focusing adjustment and a 3-way safety switch with "off," "on," and "intermittent" positions. Focussing is adjusted by a turning movement of the head. The depression of a stud enables the whole head of the torch case to be removed, thus making the interchangeability of the bulb an easy and simple matter.

The "Hike-lite"

The case is of solid drawn nickel-plated brass, and each torch is fitted with a spare bulb, protected from breakage by a domed cover fitted inside the bottom cap. An "Ediswan" new process battery is provided. The price is 10s.

Transformers for Handlamps

Two new transformers are being marketed by the RUNBAKEN MAGNETO CO., LTD., 280, Deansgate, Manchester. These have been designed for factory-type handlamps and give 18 W at 12 V, or 60 W at 50 V. Besides the safety of using a low voltage lamp, it is possible to use a very much more robust lamp on 50 V than 200 V. The illustration shows the two first experimental models, other refinements such as a switch on the h.t. or an interlocking plug on the l.t. will be obtainable in later models.

Small Tap Water-heater

MR. J. G. PERKINS, 51, Owen Road, Kirkdale, and MR. W. ORPEN, 32, Snowdrop Street, both of Liverpool, claim to have invented an attachment consisting of a small cylinder containing an electrical water-heating device for fixing to any cold tap. Portability is one of its features, since it can be removed from one tap and fixed on another in a few seconds. The patent provides for the attachment to a cold-water pipe of twin taps, one turning on the cold water direct, and the other passing it through the electrical heating cylinder. Any voltage, a.c. or d.c., may be used, and the output of hot water per hour is regulated by the heat applied. The average life of a "refill" for the device would be 1,000 working hours.

Hermetically Sealed Transformers

AN innovation of some importance is the method by which the British Electric Transformer Co., Ltd., Hayes, Middlesex, seeks to avoid the risk to which transformers working in damp situations are exposed by way of atmospheric contamination of oil or complete flooding by storm water. The company is now able to offer transformers in hermetically sealed cases, which in all circumstances will prevent contact between oil and atmosphere, avoid wastage of oil, and reduce maintenance and breathing.

The expansion apparatus consists of a flat round oil container attached at its centre to the transformer tank lid so that its interior is in communication with that of the parent tank and is completely filled with oil. It is constructed of two corrugated copper discs, joined together on their outside edges by a solid band one inch wide and left free to expand outwards from each other in the centre.

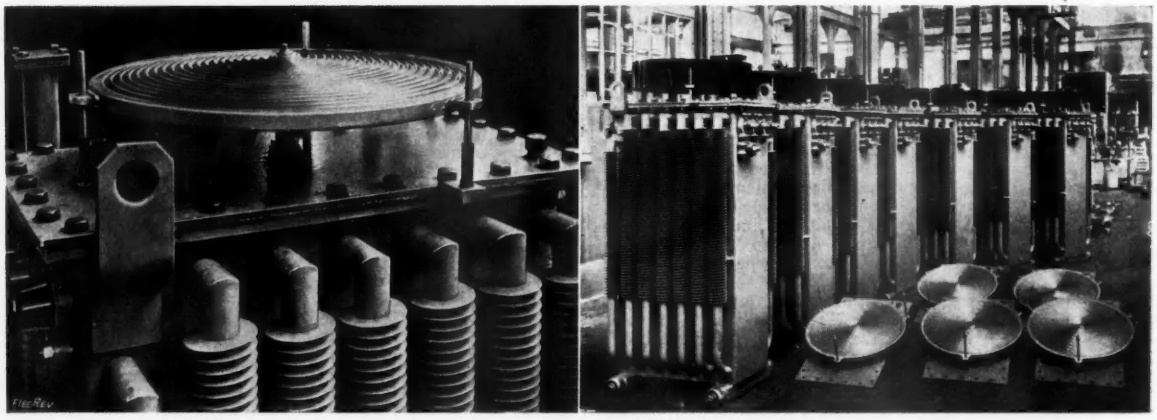
The plane of the discs is always horizontal, so that the fluid pressure inside is equal at every point on their periphery. The central connection to the tank lid serves both as a support for the device and also as a pipe to allow oil to flow freely between the parent tank and the expansion chamber.

The apparatus illustrated is in position on the lid of a 120-kVA transformer and duly expanded for a rise of 30° C. The three legs on the periphery of the discs are drilled to slide freely over the three steel standards fitted to the tank lid which act as guides for the disc as it rises and falls according to the temperature. The upper portions of these steel standards are screwed and fitted with nuts, which secure a steel protective cover in position.

A part of a large order for such transformers with their steel protective covers fitted is shown, and also a few of the expansion discs lying beside the transformers.

The diameter of the discs is so arranged that for a 50° C. rise in tank temperature the back pressure from the flexible diaphragms when expanded does not in any case exceed 2 lb. per sq. in. The temperature rise in the expansion device is never so great as in the transformer tank itself, the figure usually reached being about two-thirds of the tank temperature owing to the greater proportion of cooling surface exposed by the discs.

The new apparatus is applicable to any small or medium-sized unit whose design permits of its complete sealing at the makers' works. Special arrangements have been made by the company for filling and sealing these transformers, so that at ordinary temperatures the tank is under a slight vacuum of about ¼ lb. per sq. in. This is found to be rather an advantage as it reduces the back pressure reached at higher temperatures by a corresponding amount.



The oil container fitted to a transformer and (right) part of a large order for hermetically sealed transformers

The Electrodeposition of Tin

WHILE considerable developments have occurred in recent years in the electrodeposition of such well-known metals as nickel, copper, zinc, and, latterly, cadmium and chromium, comparatively little has been published on the subject of tin deposition. The reason is that any method of depositing tin has a powerful competitor in the existing hot tinning process, which probably represents the biggest single application of this metal.

A paper which has been read by Messrs. L. Wright and F. Taylor on the electrodeposition of tin from alkaline solutions before the Electroplaters' and Depositors' Technical Society served to awaken a new interest in tin plating. Lt.-Col. S. Heckstall-Smith (of the Tin Research Committee), who presided at the meeting, said that he represented the interests of five Governments, which had combined to subscribe a very substantial sum over a term of years for research and development work in order to find improved and new uses for tin. The subject of tin deposition had been neglected, particularly in this country. There was a considerable industrial use of tin for electroplating in the United States, largely due to the enterprise of an important chemical company which operated an alkaline bath, which was claimed to be easily controlled and economical in operation.

Many new industrial uses were being developed: 40 per cent. of all the automobiles in the United States, possibly 1,250,000 vehicles, representing five or six of the most important makes, had been fitted with cast-iron pistons electroplated with tin. Another development in the United States was a cleaning and de-scaling process, electrolytically operated, in which tin anodes were used in an acid bath, the object to be de-scaled serving as the cathode. Completeness of de-scaling and cleaning was shown by the completeness of the coating. The coating was then removed in an alkaline bath in which the de-scaled object served as the anode. Forgings and heat-treated objects were de-scaled by this method in five to ten minutes with no detrimental effect. In America during the "slump" year, when practically every industry had fallen off heavily, the electrodeposition of tin stood almost alone in showing an increase.

Mr. Wright, who presented the paper, said, *inter alia*, that tin coating until recent years had invariably been produced by immersing the clean steel plate in a bath of molten tin. The ease with which this process was accomplished had retarded the possible use of electrodeposited coatings.

The conclusions reached by the authors were as follows:—Alkaline tin solutions made from stannous chloride are capable of yielding good tin deposits at rather low cathode efficiencies. The tin content of the bath must be maintained by frequent additions of tin salts. The free alkali content of the bath must be maintained as low as possible to prevent extensive carbonation and to assist anode corrosion. The tin anodes must be the purest obtainable, since insoluble impurities assist the film formation at the anode. An addition agent, such as glucose, is of assistance in the formation of smooth reguline deposits.

The solutions should be operated at a temperature of about 70 deg. C., and the anode to cathode ratio maintained at about 2:1. The higher the temperature of operation up to this value the greater the tendency for the anodes to dissolve in the stannous condition. A large anode area reduces the anode current density and diminishes the film formation at the anode. Alkaline tin solutions possess an ultimate composition in which their tin content exists almost wholly in the stannate condition, but analysis failed to reveal any relationship between the stannate and stannite concentrations.

Such baths are by no means satisfactory, since the building up of heavy smooth deposits more than 0.001 in. thick is impossible. Further, the unbalanced electrode efficiencies cause the formation of insoluble tin salts, which become suspended in the solution, encouraging the formation of spongy deposits. However, for most purposes only thin deposits are required, and a solution made from stannous chloride and caustic soda, together with an addition agent, will meet this requirement. Baths made from stannous chloride only differ in the initial state as to their tin content from those made from sodium stannate, the ultimate composition being essentially the same.

This survey of alkaline tin solutions indicates that very little is known about the function of the constituents of tin solutions. Much research work is required to elucidate the problems, particularly the effect of such anions as chlorion, tartrate ion, acetate, and borate ions on the functions of the anode and on the stability of the solution.—S. WERNICK.

Progress in Ontario

A review of the past year's activities of the Hydro-Electric Commission

CONTINUED expansion in almost every branch of its work is disclosed in the annual report of the Hydro-Electric Power Commission of Ontario, which has recently come to hand. The report, which covers the activities of the Commission for the year ended October 31st last, also embodies the financial statements for the calendar year 1931 of the municipal electrical utilities operating in conjunction with its various systems.

At the end of the fiscal year the number of municipalities served in Ontario by the Commission was 721, this number including 27 cities, 93 towns, 263 villages and police villages, and 338 townships. With the exception of 12 suburban sections of townships known as voted areas, the townships and 86 of the smaller villages are served as part of 167 rural power districts.

Constructional Activities

Among the principal constructional activities of the Commission during 1931 was the virtual completion of the hydraulic structures of the joint Chats Falls development of the Commission and the Ottawa Valley Power Co. This work has taken a little over two years and is an exceptional achievement, the favourable climatic and stream-flow conditions greatly facilitating the progress of the scheme. The ultimate capacity provided for is 280,000 h.p., of which 224,000 h.p. in eight units is at present being installed. The maximum head developed is about 58 feet.

The Alexander hydro-electric development on the Nipigon River at present comprising three 18,000-h.p. units

At the Alexander power development on the Nipigon River, which was placed in operation in 1930, the second and third units were installed, bringing the capacity up to 54,000 h.p., and headworks have been installed for a fourth unit. Improvements and repairs were carried out at the Big Chute plant on the Severn River and at the South Falls plant on the Muskoka River.

The addition of two 45,000-kVA transformer banks at Toronto-Leaside transformer station raises the capacity of the station to 270,000 kVA, and practically completes the installation necessary to receive the power contracted for from the Gatineau Power Co., and the first year's output from the Chats Falls development. The construction of the Leaside station with the 220-kV transmission lines is a noteworthy achievement, and in respect to climatic conditions to be provided for and the undeveloped territory traversed for about half the length of the line the undertaking is unprecedented anywhere in the world.

Two transformer banks were also installed at the Toronto-Bridgman transformer station, while a new 130-kV transmission line, 189 miles long, was constructed between Hunta and Sudbury.

Operating Conditions

No failures of moment are recorded during the year either in station or line equipment, but the output of many of the smaller hydro-electric plants was curtailed through continued lack of rain, the Georgian Bay and Eastern Ontario systems and the Nipissing district being most seriously affected. Power shortages would have occurred if the danger had not been foreseen and arrangements made in time to avert it.

The economic depression has had an adverse effect on the loads of all systems, checking growth where it has not actually caused a decrease. The total peak load was 1,028,294 kW in December, 1931, as against 1,099,278 kW in December, 1930, the Niagara system's share declining from 841,400 to 775,180 kW; the 1931 figures do not, however, include energy exported. It is interesting to note that, apart from a small district near Niagara River and in the neighbourhood of Port Arthur, the Commission's load throughout the Province shows a decrease of less than one-third of one per cent.

At the end of the period under review the total investment of the Commission in power undertaking and hydro-electric railway was $267,575,540, exclusive of government grants in respect of construction of rural power lines; and the investment of the municipalities in distributing systems and other assets is $105,434,582, making a total of $373,010,122.

The Commission received a total revenue of $27,908,154, and after providing for all fixed charges, operating and administration expenses, &c., there was a net surplus of $658,751. In the preceding year the income was $28,555,998, and the net surplus $1,262,457. The total reserves of the Commission and the municipal electrical utilities for sinking fund, renewals, contingencies, and insurance purposes, amount to $115,639,726.

Rural Electrification

During the past few years very substantial progress has been made in rural electrification, and practically all rural service is now given through rural power districts operated directly by the Commission. There is now rather more than $15,507,000 invested in the rural power district schemes established by the Commission. A total of 8,179 miles of transmission lines have been constructed, of which 1,470 miles were constructed during the past year. There are now more than 55,000 supplied in the rural power districts.

Work in the Laboratories has been well maintained and there has been an increase in routine testing, which has in many cases resulted in research work of major importance to the Commission. The testing work for organisations outside the Commission has also increased, while the main research activities of the department have been in the field of concrete, protective coatings, radio interference and earthing.

The Approvals Laboratory has been busier than at any previous time of its existence, although its revenue shows a decrease. For regular reports 757 applications were received, and of these 103 referred to power-operated radio devices, &c., 114 to wiring devices including panels and fuses, 190 to heating appliances, 110 to lighting equipment, and 204 to motor-driven apparatus.

Considerable trouble has been experienced in the enforcement of the regulations respecting the sale of electrical equipment. A large number of manufacturers of unapproved and dangerous water heaters endeavoured to flood the market. These heaters were sold by itinerant vendors or by mail order, and it was extremely difficult to detect them.

As a result of decreased building activity the Electrical Inspection Division shows a decline in revenue, the total number of inspections made being 177,782, a decrease of 4.9 per cent. An important extension of the work of this department was made during the year in the matter of earthing in rural areas, and the results have been very encouraging. An extensive series of tests was made on tower-footing resistances on the 220-kV line from Chats Falls to Leaside, and close attention was given to development in the problem of radio interference.

The report proper concludes with a review of the operation of the electric railways controlled by the Commission, the remainder of the volume being devoted to statistical matter relating to the operation of each municipal undertaking. Excellent illustrations appear throughout the 502 pages, and there is a large scale map of the area in which the Commission operates. A complete index is appended.

Canada's Central Station Industry

Canada's central electric station industry has established a remarkable record for dependability of power supply at rates which have resulted in the complete electrification of a number of outstanding Canadian industries. This record has been achieved because of the accessibility and extent of Canada's water power which, at the present time, supplies 98 per cent. of the electricity distributed in Canada and, because of the high efficiency in operation and service effected by the interconnection of generating stations and transmission systems.

The Dominion Water Power and Hydrometric Bureau has made an annual study of the development of these major organisations of the industry since 1922. During 1922 there were seven central station organisations, each of which generated more than one hundred million kWh of electricity, while during 1931 there were twenty-one. The total output of the seven systems generating more than 100 million kWh in 1922 was 6,602 million kWh, while the twenty-one organisations in 1931 generated an aggregate of more than 15,413 million kWh.

Business and Industrial Notes

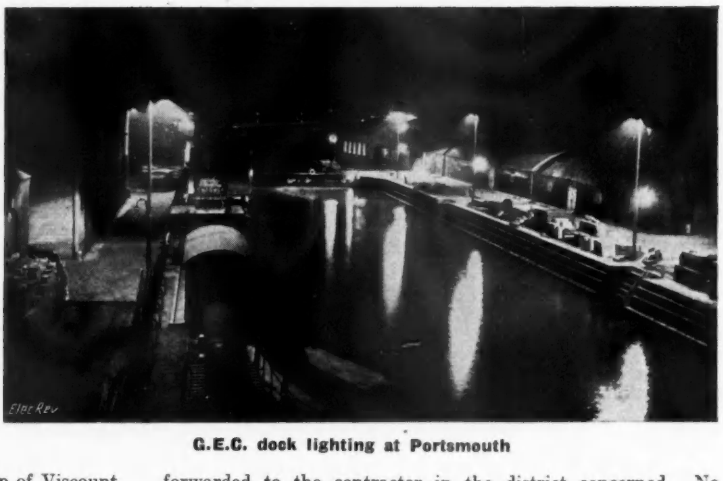
The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The Architects' Building Centre

The equipment of the Architects' Building Centre at 158, New Bond Street, London, as a permanent building exhibition is now almost completed and the official opening will take place next month. The British Electrical Development Association is taking a very prominent part in the work, and in addition to organising the electrical section is responsible for the entire electrical installation and the lighting equipment.

New Dock Lighting System at Portsmouth

The recently installed new dock lighting system at the coal handling dock of the Portsmouth Electricity Department is giving satisfactory results. The dock is 345 ft. long by 70 ft. wide and the lanterns, fitted with 500-watt Osram lamps, are spaced 110 ft. apart on the shed side, and 150 ft. apart on the crane side. The amount of electricity used for this lighting is estimated as being 1 kWh per three tons of coal handled. The value of the new system of lighting may be gauged from the fact that as much as £11 in unloading dues have been earned in a single night. This is due entirely to the highly efficient lighting—the rate of discharge now varying very little between night and day. The lanterns are of the G.E.C. Port of London type with silvered glass reflectors and an angle of cut-off designed to prevent glare impeding the navigation of boats in confined areas after daylight.



G.E.C. dock lighting at Portsmouth

Davey, Paxman & Co. (Colchester), Ltd.

We learn that this company, which was registered on August 2nd to take over the business of Davey, Paxman & Co., Ltd., is continuing the production of boilers, steam and Diesel engines and other specialities, formerly made by its predecessors, in addition to the manufacture of special machinery which has, prior to the introduction of tariffs, been manufactured abroad. The company is under the chairmanship of Viscount Goschen, with a directorate of gentlemen of extensive financial and business experience. Generally speaking the personnel of the old company will be retained, thereby ensuring absolute continuity of policy, experience, manufacture and service. The active management of the business will be in the hands of Mr. P. A. Sanders and Mr. E. P. Paxman. The head office and works will be at Standard Ironworks, Colchester (telephone: Colchester 3151), while the London office will be at Aldwych House, W.C. (telephone: Holborn 4966).

Paxman Diesel engines have recently been installed in the power houses of the Bank of England and the Prudential Assurance Co.

Birmingham and Electrical Contractors

Negotiations have been successfully completed between the Birmingham Electric Supply Department and the Birmingham branch of the Electrical Contractors' Association whereby contracts and canvassing in connection with the assisted wiring scheme are to be carried out by members of the Association, provided they are Registered Contractors. The scheme will be carried out on an experimental basis for twelve months. The city has been divided into thirty-one districts, while the outlying areas served by Birmingham have been formed into six districts. Each district has been allocated to one of the members, who undertakes to make a thorough canvass. All inquiries and orders coming through the Department will be forwarded to the contractor in the district concerned. No contractor is to canvass in another contractor's district, nor carry out an order obtained from another district unless he receives the express permission of the contractor to whom the district belongs. At the same time there is nothing to prevent any other contractor taking an order to the Department and carrying out the work.

Sunderland Tramway Employés' Wages

Sunderland Town Council has adopted a recommendation from the Tramways Committee for a reduction of 2s. per week in tramwaymen's wages as from the first full pay in January, 1933. The tramwaymen have agreed to the reduction.

British Overseas Electrical Trade in July

THE official statistics tabulated below relating to Great Britain's overseas electrical trade during July disclose a decline of approximately 9 per cent. in exports as compared with June, while imports rose by 14 per cent.

Electrical machinery exports generally have not maintained the upward trend noticeable in the preceding month's figures, falling from £342,315 in June to £315,095 last month. Decreased purchases are reported in almost all markets, European countries, South Africa, and "other countries" in particular taking respectively £13,203, £29,568, and £8,575 worth of goods less; an encouraging feature was, however, an increase from £64,992 to £93,574 in the purchases of British India.

Compared with July, 1931, the most serious decrease in electrical machinery exports were £16,621, £11,787 and £54,807 respectively in the purchases of South America, South Africa, and "other countries," but substantial advances are recorded in goods purchased by European countries (£32,721 increase) and British India (£50,294 increase).

	Exports.			Imports.			Re-Exports.		
	Electrical exports for July, 1932.	Inc. or dec. as compared with June, 1932.	Inc. or dec. as compared with July, 1931.	Electrical imports for July, 1932.	Inc. or dec. as compared with June, 1932.	Inc. or dec. as compared with July, 1931.	Electrical re-exports for July, 1932.	Inc. or dec. as compared with June, 1932.	Inc. or dec. as compared with July, 1931.
Insulated wires and cables ...	£77,659	– £16,653	– £31,185	£12,413	– £6,763	– £54,854	£27	– £21	– £261
Electric carbons	2,326	+ 1,078	+ 1,022	9,511	+ 2,953	– 6,210	19	+ 3	– 679
Arc lamps and searchlights ...	146	– 694	– 24	517	+ 468	+ 345	—	—	– 87
Incandescent lamps	34,668	– 384	– 3,331	14,778	+ 2,047	– 24,684	647	+ 193	+ 410
Other lighting apparatus ...	23,724	– 95	– 9,676	18,568	+ 4,597	– 23,324	2,297	+ 1,353	+ 879
Batteries and accumulators ...	48,269	– 4,310	– 27,099	3,384	– 6,717	– 43,972	51	– 1,603	– 1,429
Meters and instruments ...	30,428	+ 8,530	+ 3,041	29,186	+ 7,766	+ 5,938	613	+ 72	+ 174
Unenumerated goods and apparatus	74,645	+ 2,585	– 63,562	45,983	+ 4,788	– 65,135	3,226	+ 1,290	– 1,814
Telegraph and Telephone Cable and Material—									
Telegraph and telephone wires and cables (not submarine)...	11,006	– 11,296	– 22,603	625	+ 128	– 2,043	171	+ 171	+ 134
Submarine telegraph and telephone cables...	4,016	+ 4,016	– 52,016	—	—	—	—	—	—
Telegraph and telephone apparatus	123,017	– 29,750	– 55,978	63,373	+ 19,411	– 47,150	5,405	+ 1,983	– 938
Electrical Machinery—									
Railway and tramway motors	7,064	– 3,017	– 80	—	—	—	—	—	—
Other motors and generators	115,626	+ 23,217	– 25,865	—	—	—	—	—	—
Unenumerated electrical machinery	192,405	– 47,420	+ 12,133	103,990	+ 7,735	– 30,106	4,259	– 4,507	– 3,575
Total	£744,999	– £74,193	– £275,232	£302,338	+ £36,413	– £291,195	£16,715	– £616	– £7,186
Decreases for the first seven months of the year... ...		Exports. £1,804,302			Imports. £1,776,654			Re-exports. £71,530	

B.T.-H. Turbo-alternators for China

The British Thomson-Houston Co., Ltd., has recently manufactured two turbo-alternators at Rugby Works for the new power plant of the Hangchow Electricity Works at Zahkou, Chekiang. These turbo-alternators each have a maximum continuous rating of 7,500/8,900 kW, 9,375 kVA, 80/95 per cent. power factor, 3-phase, 50 cycles, 13,200/14,000 V. They run at 3,000 r.p.m., the steam conditions being 350 lb. per sq. in. gauge pressure, total temperature 720°F. and vacuum 28.5 in. A scene during the transportation of one of the electrical stators through Shanghai is shown in the accompanying illustration. Owing to the disorganisation of the railways at the time on account of the political disturbances, it was necessary to take the stators by road from Yangtszepoo to the Shanghai South Station. The weight of each stator is about 20 tons and when crated, as shown, 21½ tons.

A B.T.-H. turbo-alternator at Shanghai South Station

Domestic Electrification, Ltd., Shut Down

In the course of his speech to shareholders of Messrs. Parkinson & Cowan, Ltd., on Friday last, Lt.-Col. H. W. Woodall, the chairman and managing director, stated that the larger portion of the depreciation provided for was consequent upon the decision of the directors to close down the operations of Domestic Electrification, Ltd., one of the smaller of the company's subsidiaries, which had made losses since its formation in 1927. He added that although it was conceivable that that company might ultimately have been made a success, they felt that it was wiser not to run the risk of further losses, and that in any case the money and energy required for the purpose could be better employed in other directions.

Electrical Contractors and the Building Industry

On August 10th the Conference on Unemployment in the Building Industry held an emergency meeting at the Royal Institute of British Architects to consider the serious position which faces the building industry in respect of unemployment. "Creeping paralysis" is the expression used to describe the state of things. We note from newspaper reports that the bodies present included representatives of the Institution of Electrical Engineers, the Structural Engineers, the Mechanical Engineers, and the Architects, but we fail to find mention of the Electrical Contractors' Association. If, as we read, steps are to be taken to form a permanent central council representing all bodies interested in the future prosperity and efficiency of the industry, surely the Electrical Contractors' Association should have at least a place!

E.D.A.-E.L.M.A. Hotel Lighting Campaign

The British Electrical Development Association has issued the programme of a campaign, which it is organising in conjunction with E.L.M.A., to improve the lighting of hotels in this country. The sub-committee which is organising the campaign is under the chairmanship of Brig-Gen. R. F. Legge; special conferences have been held throughout the country and the E.D.A. Area Committees are giving their support. The programme sets out the objects of the campaign, the benefits to be derived from it by both hotel proprietors and the electrical trade, and particulars are given showing how the campaign is being organised.

A petrol service station on the Bath Road in which electricity is extensively used

The Marking of Rubber-covered Wire

A Proclamation made under the Australian Customs Act dated April 2nd, 1919, prescribes certain conditions as to marking, etc., with which rubber-covered wire imported into the Commonwealth must comply. It has been decided that such wire if used for radio purposes is exempt from the Proclamation provided it is packed so as to indicate clearly that it is intended for radio purposes; the manufacturer's name and address must also appear on the container.

Electrical Trading in France

Complaint was made by electrical contractors at the recent French National Low Tension Congress at Marseilles that in many districts electricity distributing undertakings permit their employés to carry out house and shop lighting installations in their spare time to the detriment of established traders who have not only their establishments to maintain but also the various French taxes to pay. A resolution was adopted to the effect that electricity distributing concerns should prohibit their employés from undertaking such work or effecting electrical repairs for private people in their spare time. Other speakers pointed out that traders were also experiencing unfair competition at the hands of many electricity distributors who were selling radiators and other appliances at less than the makers' list prices, and a resolution was adopted that electricity suppliers should not carry out such direct sales but leave the business to established traders, and, in any event, if sales were made, list prices should be adhered to.

Recent Contract

Godalming (Surrey) Corporation has recently placed a contract with Messrs. Ruston & Hornsby, Ltd., for waterworks pumping plant to be installed at the Borough Road pumping station. The main unit comprises a three-cylinder Ruston vertical fuel-oil engine driving three centrifugal pumps. A feature of interest is the arrangement whereby six alternative pumping duties are possible to suit particular local conditions. Auxiliary pumping and electric plants are included. Pumps will be manufactured by Messrs. Mather & Platt, Ltd. The works are being executed under the supervision of Mr. Ernest G. Bowyer, the Corporation water engineer and manager.

New Philips Industrial Showrooms

Philips Industrial is opening to-morrow at 143, Charing Cross Road, W.C.2, an extensive new showroom devoted entirely to the technical electrical products of the company. A wide range of very interesting equipment will be available for demonstration, including amplifiers, public address equipment, rectifiers, rectifying tubes for numerous industrial applications, thermionic regulators, photo-electric cells, &c. The company informs us that it is open to appoint agents for its public address equipment in certain provincial areas not so far covered.

Dussek Bitumen and Taroleum, Ltd.

The Dussek Bitumen Co., Ltd., and British Taroleum Co., Ltd., have amalgamated and will in future carry on business under the title "The Dussek Bitumen & Taroleum, Ltd." The direction and management will be exercised from various centres, the London office being at 13, Regent Street, S.W.1.

Proposed All-electric House at Dumfries

An all-electric house is suggested by Dumfries Corporation electrical engineer in connection with the housing scheme. Supporting the proposal at the last meeting of the Town Council, Judge Kelly said that in Clydebank 350 all-electric houses had been built and that the cost of electricity in an all-electric house would be only 3s. or 3s. 6d. per week. A deputation is to visit places where such a scheme is in operation.

Neon Lighting at the London Pavilion

The "Claudegen" animated sign at the Pavilion Theatre, London, designed by Claude-General Neon Lights, Ltd., is claimed to be the largest neon sign in Great Britain. On the Piccadilly elevation the first phase of the flashing shows the words "Non-Stop Variety" in 8-ft. double outline red neon letters, and also a night reveller in dress suit, clinging to a lamp post. He is seen endeavouring to free himself in order to pay his respects to a dancing lady. The second phase shows a dual comedy act, consisting of the reveller and the lady whose acquaintance he has made, a troupe of dancers, and a

juggling turn, all of which are animated. The whole is surrounded by a "Claudegen" sunlight border which is the first exterior installation of its kind in this country. On the Shaftesbury Avenue elevation there is a big announcement, reading "The World's Greatest Stars in Non-Stop Variety," the letters forming the last three words being 7 ft. high. Altogether about 126 transformers are used, the current consumption being approximately 35 to 40 kWh per hour.

Faulty Wiring: Bethesda Council's Decision

Mr. Hugh Owen, electrical engineer, has written to the Bethesda Urban District Council, complaining of the large amount of faulty wiring which is being carried out in Bethesda. He has suggested that the Council should publish a notice that no one should make an extension without the Council's sanction, and that if anyone did so that the Council should take legal action. The Council has adopted the recommendations contained in the letter.

Lighting Units

The Revo Electric Co., Ltd., will be exhibiting its public lighting equipment at the forthcoming conference in Blackpool of the Association of Public Lighting Engineers.

Cinema Lighting

What is perhaps the most modern and well equipped cinema north of the Forth has recently been completed at Dunfermline. As will be seen from the accompanying illustration, the lighting harmonises completely with the severe motif of the decorative scheme. The main lighting of the auditorium is provided by means of 350 Mazdalux asymmetrical reflectors, concealed in false roof beams and fitted with natural colour lamps, which are controlled by a dimmer, while the exterior

Ediswan cinema lighting at Dunfermline

of the building is floodlighted by five "Ediswan" floodlight projectors. The lighting schemes for both the interior and the auditorium, including the lighting of the stage itself, were planned by the illuminating engineers of the Edison Swan Electric Co., Ltd., in collaboration with the proprietor of the cinema, Royal "Ediswan" lamps and lighting equipment being employed.

Irish Free State Electrical Imports

A fair degree of activity again prevails in the electrical trade in the Irish Free State, the imports of electrical machinery fittings and apparatus during June last having amounted to £47,685, bringing up the total for the six months ended with June last to £338,990, as compared with £323,452 in the corresponding period of last year. The details of the six months' imports are appended:—

	January to June. 1931.	1932.
	£	£
Electric machinery	94,852	97,603
Electric wires and cables	48,201	52,236
Wireless sets and parts	46,981	93,131
Electric lamps and parts	30,494	24,218
Other electrical goods	89,980	67,943
Copper wire	13,144	3,859
Totals	£323,452	£338,990

United States Electrical Trade

Compared with the corresponding month of last year there was a drop of 56 per cent. in the exports of electrical equipment from the United States during May, the total for that month amounting to only $4,085,281 ($9,052,544 in May, 1931). For the first five months of the year exports totalled $22,570,556, a decrease of $19,200,934, as compared with the corresponding period of 1931. The values of the principal items for May are summarised below, the figures for May, 1931, being given in parentheses:—Generators and parts, $269,715 ($758,876); arc welding sets, $11,375 ($51,290); batteries, $26,733 ($545,556); transforming and converting equipment, $70,844 ($215,694); transmission and distribution apparatus, $173,388 ($408,844); motors, $141,210 ($386,094); electric locomotives, $261,016 ($39,953); starting and controlling equipment, $40,536 ($136,839); portable electric tools, $28,153 ($55,042); accessories and parts for motors, $85,929 ($128,404); refrigerators and parts, $751,813 ($1,908,923); fans $24,990 ($51,149); washing machines, $28,389 ($124,492); domestic vacuum cleaners, $72,877 ($136,610); cookers, furnaces and other heating devices, $37,429 ($142,383); therapeutic and X-ray apparatus, $47,704 ($115,856); radio apparatus, $879,954 ($1,784,087); telegraph and telephone apparatus, $66,431 ($205,785).

Canada was the principal customer, purchasing $913,638 worth of goods, Soviet Russia and Argentina coming second and third with $413,436 and $240,985 respectively. The United Kingdom, taking goods to the value of $168,760, was fourth.

Imports of electrical apparatus amounted to $169,210, as compared with $235,728 in May, 1931, the principal item being electrical lamps ($121,159).

Czechoslovakian Electrical Imports

The value of electrical machinery and apparatus imported into Czechoslovakia during June amounted to 11,420,000 crowns, making the total for the first six months of the current year 103,018,000 crowns.

Economic Conditions in Turkey

Col. H. Woods, O.B.E., Commercial Secretary to H.M. Embassy, Istanbul, has prepared a report for the Department of Overseas Trade on the economic conditions in Turkey (H.M. Stationery Office, 1s. 6d. net). This states that there has been little or no improvement in the situation. Throughout the years 1930 and 1931, general depression prevailed, and the immediate future is not encouraging. Germany has hitherto received the bulk of the market for electrical machinery and implements because of the fact that her principal manufacturers have opened branch offices or have subsidised local agents to enable them to open showrooms with adequate stocks. United Kingdom prices are now competitive on this market, and the local market appears to be worthy of consideration by United Kingdom manufacturers. Electrical machinery and equipment, except for accumulators and batteries, are not subject to quota restrictions. The voltage in Istanbul is 110 and 220 a.c., and in Arkara 220 V a.c. Wireless apparatus imported into Turkey during 1931 totalled 9.464 kilos. (value £T.88,329), as against 15,220 kilos. (value £T.141,619) in 1930, the United Kingdom's share being 535 kilos. (£T.2,865), and 164 kilos. (£T.1,606) for the respective years. The demand for wireless apparatus is on the increase and the United Kingdom should be able to secure an increased share of the trade. The quotas for the first six months of 1932 amounted to 9,939 kilos., which was more than the actual imports in the whole of 1931.

The Home-Lovers' Exhibition

The North London Home-Lovers' Exhibition will be held at Alexandra Palace from October 5th-22nd. The exhibits will include heating and lighting apparatus, labour-saving devices, and radio apparatus.

Trade Announcements

As from August 29th, the new address of the Ipswich branch of the General Electric Co., Ltd., will be Electric House, Lloyds Avenue, Ipswich. The telephone number will remain unchanged.

Mr. Stanley Lee has commenced business as electrician on his own account at 82, Whinbush Road, Hitchin, Herts, and asks for lists.

The Argentine Radio Market

Until quite recently, the development of broadcasting in Argentina has been very much retarded, and although there was a considerable increase in sales of apparatus and accessories in 1931 compared with the previous year, even those figures are not a true indication of the possibilities of the market in the future. With regard to prospects of trade for United Kingdom manufacturers, a Department of Overseas Trade report states that they must be willing to give at least equally favourable terms as their American rivals. Agents expect their principals to assist them in advertising and other expenses of placing their goods on the market. If manufacturers are prepared to do this and can offer a type of apparatus which is both powerful and of great selectivity, they would have good prospects of doing business owing to the generally favourable attitude of this market to United Kingdom manufactures. Firms would be well advised to send out a technical expert before attempting to enter the market in order to make a thorough investigation of the conditions. There is still a large unsatisfied demand which does not seem to be checked by the economic depression.

Reorganisation of Moscow Electric Plant

Electrozavod, the largest electrical equipment plant in the Soviet Union, is being reorganised into a combine, to consist of four separate factories, one of which is to produce transformers and electric ovens, another projectors, the third lamps and the fourth electric equipment for automobiles and tractors. The purpose of the reorganisation is to effect greater efficiency through specialisation. Under the second Five-Year Plan the output is to be brought up to 621 million roubles, as against 238 million roubles this year.

Swedish Electrical Imports and Exports

The imports of electrical machinery into Sweden during June last attained a value of £64,460 as compared with £104,135 in the corresponding month a year ago. There was also a decline during the same period in the exports of electrical machinery from Sweden, from £195,590 to £132,780.

Stand-by Lighting in Cinemas

The Accumulator Makers' Association has issued the neat lantern slide, here illustrated, to cinema proprietors who have installed batteries to maintain the lighting of their halls in the event of the failure of supply from the public mains. In order to comply with the regulations made under the Cinematograph Act, 1909, the auditorium and exits must be adequately illuminated during the whole time the public is present. The safety lighting is required to be supplied from a separate source from that of the general lighting of the premises. The simplest method is to take the safety lighting normally from the mains at a reduced voltage through a resistance. Failure of the main supply would cause an automatic switch instantaneously to throw this section of the lighting over to the battery, which would be kept ready for its work by being trickle-charged from the mains. The scope of this system is not confined to cinemas, it could be usefully applied wherever it is essential to maintain emergency lighting under all conditions of service.

A CERTIFICATE of SAFETY & COMFORT
The management of this Theatre have installed a Storage Battery Plant as a precaution against lighting failure.
THE ACCUMULATOR MAKERS' ASSOCIATION
Secretary
Issued by the THE ACCUMULATOR MAKERS' ASSOCIATION 66, Victoria Street, London S.W.1

An A.M.A. Certificate

Social Event

The sports of "Metrovick" apprentices were held at Fallowfield, Manchester, on August 13th. Mr. R. T. Mellor, secretary of the trade apprentice section, won seven of the cycle races. The lap prize in the 5-mile race was won by J. R. Walton, the late chairman of the trade section, who was also first in the 2-mile championship cycle race and took the lap prize for this race with R. T. Mellor second. Running events, putting the weight and throwing the cricket ball formed part of the programme. In the tug of war, Plant and Research Division was the winner.

New Catalogues and Lists

Baxendale & Co., Ltd., Miller Street, Manchester.—A 96-page revised pocket catalogue (No. 3218) illustrating and describing electric lighting and power accessories.

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.—Leaflet No. 363/6-1 describing continuous position indicators. Also a 16-page booklet on "Emvee" electrodes for arc welding.

Sunbeam Motor Car Co., Ltd., Moorfield Works, Wolverhampton.—A catalogue dealing with "Sunbeam" trolley-buses which are now fitted with B.T.-H. electrical equipment.

Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.—Leaflets Nos. 100 and 995, dealing with double-pole push-button starters.

Corona Lampworks (Southern), Ltd., 22a, Cavendish Square, W.1.—A price list of "Corona" lamps.

Bankruptcy Proceedings

W. J. R. Ashley (trading as Southern Wireless Services), wireless and electrical engineer, 151, London Road, North End, Portsmouth, and at Warflete, Auckland Road, West Southsea, Portsmouth.—This debtor attended at the Court House, Portsmouth, recently for his public examination. He had prepared a statement of affairs which showed gross liabilities of £754, of which £721 was expected to rank for dividend. The deficiency amounted to £637. The hearing was adjourned.

G. A. Laird, 118, Woodside Avenue, Coventry, and **D. Hyde**, The Cot, Meriden, near Coventry (trading as "Burbury, Laird & Co." at 6, Warwick Row, Coventry).—A statement of accounts shows gross liabilities of £3,710, of which £3,518 is due to 91 unsecured creditors. The assets are estimated to produce £1,354, and there remains a deficiency of £2,276. The causes of the failure are stated to be "lack of capital and bad trade."

L. G. H. Cantle, wireless engineer, Woodbury Cottage, Woodland Grove, Oatlands Park, Weybridge.—Receiving order made August 4th on a creditor's petition.

A. E. Shapland, electrical engineer, Chippenham Cottage, Exmouth.—Supplemental dividend of 4½d. in the £, payable August 17th at the Official Receiver's offices, Exeter Bank Chambers, Broadgate, Exeter.

Company Liquidations

Hanson Electrical Supplies, Ltd., wholesale dealers in electrical equipment, 92a, Baker Street, London, W.—Under a winding-up order made on July 4th on the petition of Electrical Lamp Factors, Ltd., the statutory meetings of creditors and shareholders were held recently at the Board of Trade Offices, Carey Street. The company's failure was attributed to insufficiency of capital. A statement of affairs had been filed showing liabilities of £1,684, of which £1,677 was expected to rank, and estimated net assets £869, with a total deficiency of £1,006 with regard to the shareholders. A resolution was passed for the appointment of Mr. George A. Todd, 10, Copthall Avenue, City, as liquidator. The following are the principal creditors:—Armorduct Cable Co., Ltd., £87; British Thomson-Houston Co., Ltd., £65; Credenda Conduits Co., Ltd., £130; Electric Lamp Factors, Ltd., £94; General Electric Co., Ltd., £52; Metallic Seamless Tubing Co., Ltd., £106; M. R. Electric, Ltd., £56; Simpson Baker & Co., Ltd., £95; E. G. W. Wallis, £250; and Z Electric Lamps, Ltd., £174.

Symentis Products, Ltd.—Particulars of claims by August 27th to the liquidators, Messrs. A. T. Cooper and R. Hindley, 60-62, Spring Gardens, Manchester.

Furnace Electric Heating Co., Ltd.—Meetings September 9th at 22a, Commercial Street, Halifax, to receive an account of the winding-up by the liquidator, Mr. C. Peckett.

Wanstead Electric, Ltd.—Winding up voluntarily. Liquidator, Mr. E. W. Longhurst, Portland House, 73, Basinghall Street, E.C.2.

Harlie Bros. (Edmonton), Ltd.—Winding up voluntarily. Liquidator, Mr. R. A. Vivian, 154, High Street, Putney, S.W.

Horrabridge and District Electric Supply Co., Ltd.—Particulars of claims by August 31st to the liquidator, Mr. A. A. Gates, of Christie Bros. & Co., Ltd., Chelmsford.

Jaxons, Ltd.—Meeting September 14th at 58, Theobalds Road, W.C., to receive an account of the winding up by the liquidator, Mr. F. W. Davis.

Dissolution of Partnership

A. Wade & Co., distributors and retailers of wireless receivers, 9, Carlton Road, Burnley.—Messrs. W. Moore and A. Wade have dissolved partnership.

Meeting of Creditors

Yesly Electrical Supplies, Ltd.—Creditors' meeting August 17th at Balfour House, Finsbury Pavement, E.C.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, Etc.	Price Aug. 17th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£17	—
a Potash, Chlorate ... ... per lb.	3⅝d. to 4⅝d.	—
a ,, Perchlorate ... ... ,,	5½d.	—
a Shellac T.N. ... ... per cwt.	£3 15s.	—
a Sulphur Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3½d. to 3⅝d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d.	—
METALS, Etc.		
b Aluminium, Ingots ... ... per ton	£95 to £100	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ... ,,	1/1½ to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£136	£16 inc.
Grade II ... ... ,,	£96	£11 inc.
Grade III ... ... ,,	£52	£4 inc.
c Brass (rolled metal 2" to 12" basis)... per lb.	7d.	¼d. inc.
c ,, Tubes (solid drawn) ... ... ,,	9d. to 9¼d.	¼d. inc.
c ,, Wire, basis ... ... ,,	7⅝d.	¼d. inc.
c Copper Tubes (solid drawn) ... ... ,,	10d.	¼d. inc.
g ,, Bars (best selected) ... ... per ton	£62	£5 inc.
g ,, Sheet ... ... ,,	£62	
g ,, Rod ... ... ,,	£62	
g ,, (Electrolytic) Bars ... ... ,,	£36 5s.	—
d ,, ,, Sheets ... ... ,,	£64	—
d ,, ,, Wire Rods ... ,,	£36	—
d ,, ,, H.C. Wire ... per lb.	5½d.	—
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
n German Silver Wire ... ... ,,	2/2	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	4⅝d.	⅛d. inc.
i Iron, Pig (Cleveland No. 3) ... ... per ton	58/6	—
i ,, Wire, galve. No. 1, P.O. qual. ,,	£20	—
g Lead, English pig ... ... ,,	£13	15s. inc.
g Mercury ... ... per bot.	£9 10s. to £9 15s.	5s. inc.
e Mica (in original cases) small ... per lb.	6d. to 8/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1d.	—
p ,, ,, drawn bars & rods ,,	10⅛d.	—
p ,, ,, rolled strip & sheet ,,	10⅛d.	⅛d. inc.
p ,, ,, wire ... ... ,,	11⅛d.	⅛d. inc.
o Platinum ... ... per oz.	£9 15s.	—
d Silicium Bronze Wire... ... ... per lb.	7⅛d.	—
r Steel, magnet, in bars... ... ... ,,	7½d.	—
g Tin, Block (English) ... ... per ton	£145 5s. to £147 5s.	£10 15s. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/1	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co. Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

Electricity Supply

Lighting, Domestic, Power

Accrington.—HIRE-PURCHASE SCHEME ALTERATIONS.—The Electricity Committee has decided to extend the terms for the hire-purchase of electrical appliances so as to include smaller articles or apparatus to the value of £2 as a minimum instead of £4 as at present.

Alderley Edge.—REDUCED CHARGES.—The Electricity Board has reduced the standard rate for electricity for lighting from 7½d. to 7d. per kWh.

Ashford (Kent).—MAINS EXTENSIONS.—The Urban District Council has decided to carry out mains extensions at Kingsnorth at an estimated cost of £615, and the electrical engineer, Mr. H. Wilson, is to report on a supply to the Smarden district.

Banchory.—A SUPPLY IN SEPTEMBER.—The Grampian Electricity Supply Co. hopes to provide electricity in Banchory some time next month.

Bedford.—TARIFF REDUCTIONS.—The Electricity Committee recommends various reductions in the tariffs representing concessions of £4,270 per annum.

Billericay.—ELECTRIC LIGHTING FOR LAINDON.—The Rural District Council has decided to apply to the Ministry of Health for powers to light the parish of Laindon.

Blackburn.—EXTENSIONS.—The Town Council is applying to the Electricity Commissioners for permission to supply electricity to Balderstone, Mellor, Osbaldeston, Salesbury, and Tockholes. Sanction to a loan of £30,000 for future expenditure in connection with mains and services has also been applied for.

Bognor.—EXTENSIONS.—An extension of the e.h.p. bulk supply has been commenced to the village of Slindon and Slindon Common. The site for an outdoor sub-station has been fixed at Wellnap Corner.

Catterick Camp.—CHANGE-OVER.—Last week-end the Newcastle-upon-Tyne Electric Supply Co., Ltd., completed a scheme for the provision of a new electricity supply to Catterick Military Camp, and the change-over from d.c. to a.c. will take place soon. To carry out the scheme it has been necessary to erect transmission lines from Northallerton to Catterick, a distance of 15 miles. The cost was £30,000. The supply is being brought from Haverton Hill at a pressure of 33,000 V.

Chelmsford.—PUBLIC LIGHTING.—The Rural District Council has accepted the quotation of the Electric Supply Corporation, Ltd., for public lighting at Great Baddow, Writtle, and Broomfield.

Clyde Valley.—STANDARDISATION OF FREQUENCY.—The Clyde Valley Electrical Power Co. has now changed over its whole supply area (over 1,000 sq. miles) to a standard frequency of 50 cycles. It is interesting to note that the work entailed has been carried out free from interruption of supply or irritation or hardship to consumers, and without litigation of any kind. The work was commenced in March, 1928, and the first actual machine was changed over in November, 1929. During operations, 13,500 motors were changed equal to 220,000 h.p. and also 80 rotary convertors equal to 44,068 h.p., while approximately 80 miles of cable were laid.

Continental. — FRANCE. — According to the *Revue Générale d'Electricité* the output of the fifty principal electric power stations in France representing about 62 per cent. of the total French production amounted during May last to 702,143,610 kWh, bringing up the total for the first five months of the year to 3,626,380,765 kWh as compared with 3,952,983,861 kWh for the corresponding period of 1931. This is a decrease of 8.26 per cent. Hydro-electric plants were responsible for 1,935,769,968 kWh, and steam and internal combustion engines stations for 1,690,610,797 kWh.

The submarine cable between Oran and Marseilles laid forty years ago is being replaced. The total distance is nearly a thousand miles, but the cable is to be laid in two parts as the Balearic Islands are situated about midway.

One of the latest French stations, Vitry-Sud (Centrale Arrighi), is situated down-stream from Paris on the Seine. The machine room contains four groups of turbine-alternators of 55,000 kW and 75,000 kVA each, as well as three auxiliary groups, supplying a total power of 235,000 kW, which will be increased later to 500,000 kW. Energy is generated at 60,000 V.

Cumberland. — RECOMMENDATION REFERRED BACK. — The County Council has referred back to the Parliamentary Committee a recommendation that the Mid-Cumberland Electricity Co. should lay underground cables in the parishes of Stainburn, Great Clifton, Greysouthern, Brigham, and Patcastle. Objection was taken to underground cables on the ground that the increased cost would make the charge for electricity in the rural area prohibitive.

Dewsbury.—EXTENSIONS.—The Electricity Committee has decided to provide a supply to the Whitley Lower district by overhead lines and is to obtain tenders for the work.

Doncaster.—PETITION IGNORED.—The Town Council has decided to take no action with regard to a petition for electricity from a number of tenants on the Warmsworth Road (North) housing estate, but has decided that no objection should be raised to the installation of electricity in any of the Corporation's houses at the tenant's cost.

Ealing.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to borrow £20,000 for sub-station plant.

Gravesend.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains to Hall Street, Northfleet, at a cost of £1,000.

SUPPLY TO CANAL BASIN.—A supply of electricity is to be given to Messrs. R. L. Priestley & Son at Canal Basin, at a cost of £700.

Great Yarmouth.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to a loan of £30,000 for mains and services, wiring installations and domestic apparatus.

Guildford.—LOAN.—The Electricity Committee is to apply for sanction to a loan of £10,000 for mains.

Hambledon.—NEW PLANT.—The Surrey County Council is to provide electric lighting plant at the Hambledon Institution at a cost of £2,530 and has appointed Messrs. Dolby and Williamson as engineers.

Holme Cultram (Cumberland).—A SUPPLY NEXT YEAR.—The Urban District Council has received from the Mid-Cumberland Electricity Co., Ltd., a communication stating that it would be able to supply the area with electricity at the beginning of next year and that a representative of the company would be in the area soon to ascertain the requirements of the residents.

Kendal.—REDUCED CHARGES.—Reductions in electricity charges have been sanctioned by the Town Council with a view to encouraging consumption on the two-part domestic tariff. Houses of a rateable value of £12 and under will be subject to 20 per cent. assessment as a fixed charge per annum; £13 to £18, 15 per cent.; £19 to £30, 12½ per cent.; £31 to £60, 10 per cent. The "unit" charge is now ¾d. The Electricity Committee has been encouraged to make these alterations by the increase in the consumption and the satisfactory net profit of £600 on the past year's working.

Lincoln.—HIRE-PURCHASE SCHEME.—The Council has sanctioned a hire-purchase scheme for electrical installations in small houses requiring not more than six lights, but not for property in course of construction, the charge to be 5½d., plus 2d. per kWh for wiring. The local branch of the Electrical Contractors' Association is to be approached with a view to reducing their prices for wiring in the event of the scheme being a success, and the showroom superintendent is to expend a sum of £100 for publicity in connection with the scheme. A recommendation that an electric iron should be given to each consumer whose house is wired under the scheme has been rejected.

Liverpool.—LIGHTING REPORT.—The total illumination used in Liverpool streets has increased from 239,240 candle-power in 1893, to 3,277,322 in 1932. The candle-power per lineal mile is 3,742. Mr. P. J. Robinson, the city lighting engineer, points out that his department is giving street lighting service four times that of forty years ago at practically the same lighting rate.

London.—ST. MARYLEBONE.—The Electricity Committee has voted for a further £5,000 for extensions of the a.c. supply.

Manchester.—STREET LIGHTING IMPROVEMENTS.—The Paving Committee has decided to carry out improvements in lighting in a number of streets within the city boundary.

Marlborough.—TWO-PART TARIFF.—The Town Council has adopted the following two-part tariff, as from October 1st next:—Lighting for business purposes under special contract: A fixed charge of 35s. per annum per 100 W of lamps installed, subject to a minimum standard of illumination. Power, a fixed charge of 10s. per 100 W per annum; heating, a fixed charge of 3s. 6d. per annum per 100 W installed, with "unit" charges of 1¼d. There will be no meter rents, and a discount of 2½ per cent. will be allowed for prompt payment of accounts.

Mid-Lancs Advisory Board.—There is a possibility that the Mid-Lancashire Electricity Advisory Board, on which are represented the constituent authorities over a broad belt ranging from Colne to Fleetwood, and including Colne, Nelson, Burnley, Accrington, Clitheroe, Blackburn, Preston, Lytham St. Annes, Fleetwood, Darwen, Haslingdon, Rawtenstall and Bacup, together with the Lancashire Electric Power Co., may cease to function. The board's purpose, in part, was to advise on areas to be developed, and the question arises whether, with this area more or less now developed, there is need for continued existence of the board. A communication on the subject of the future of the Board has been sent to each of the authorities in the area. We referred to this movement in our leading columns of July 15th.

Montgomeryshire.—RURAL ELECTRIFICATION.—The North Wales Power Co. states that the wayleave difficulties in connection with the new transmission line between Welshpool and Newtown has now been overcome, and the erection of the line is now proceeding. A preliminary investigation of the area adjacent to the line in the parishes of Leighton, Llandyssil, Berriew, and Forden shows that there are approximately ninety-two potential consumers in this area, and the cost of giving a supply would be approximately £7,770, producing a gross revenue equal to 8.6d. per cent. in the area. These figures indicate that the company could only supply after most careful investigation in each particular area.

Newburn-on-Tyne.—CABLE EXTENSIONS.—The Urban District Council has approved a scheme by the Newcastle and District Electric Supply Co., Ltd., for extending the cables from Stamfordham Road to the urban district boundary.

North-East England.—PROGRESS OF THE GRID.—Further progress has been made towards the completion of the North-East grid scheme, and last week the North Tees power station came into operation and the change-over from 40 to 50 cycles took place. The Dunston power station is expected to be in operation by the end of the year.

Northern Ireland.—PROGRESS DURING THE YEAR.—Though Northern Ireland has nothing so spectacular to show as the Shannon scheme, a report just issued by the Minister of Commerce on the progress of electricity supply during the year ended March 31st shows a considerable measure of achievement. The outstanding feature was the setting up of the Electricity Board under the Act of last year. This has proved a definite step towards large-scale generation of electricity and the formation of more economic units. During the period reviewed the Ministry placed contracts for the construction of a main transmission line from Lurgan to Portadown, Armagh and Markethill, and thence *via* Banbridge, Dromore and Hillsborough to make connection with the existing transmission line from Belfast to Lisburn, and for a line connecting Newtownards and Comber with Belfast and Bangor.

Okehampton.—OVERHEAD LINES.—The Rural District Council has given approval to the proposal of the West Devon Electric Supply Co., Ltd., to apply to the Minister of Transport for consent to erect an 11,000-V transmission line from Marytavy to Okehampton. It was stated that electricity would soon be needed at Hatherleigh for pumping the new water supply.

Ripon.—DEVELOPMENT SCHEMES.—Plans have been prepared by the borough electrical engineer for the development of the electricity undertaking in Galpay, High Grantley and Sawley areas.

SUPPLY EXTENSION.—The Electricity Committee proposes to give a supply of electricity to the parishes of Sawley, Galphay and Grantley at a cost of £1,100.

South Shields.—ELECTRICITY REPLACES GAS.—The Town Council has decided to convert gas lamps in a section of the Harton district to electricity, while the Sunderland Road is to be relighted with electricity at a cost of £425. Similar work is to be carried out in Dean Road.

Sowerby Bridge.—OVERHEAD LINES.—The Urban District Council has given permission to the Electrical Distribution of Yorkshire, Ltd., to erect an overhead line for the purpose of supplying electricity to Netherends, and also to erect overhead service lines in Sowerby town.

Stafford.—LOAN.—The Electricity Committee is to apply for sanction to a loan of £20,000 for mains extensions.

Sutton Coldfield.—CHANGE-OVER.—The Electricity Committee is to lay an additional two-core main from Thornhill Road to Manor Road at an approximate cost of £520.

Tendring.—SUPPLY TO PARKESTON DISTRICT.—The Rural Council has consented to an application by Harwich Town Council for a Special Order to supply electricity to Parkeston.

Tonbridge.—EXTENSIONS.—The Urban District Council has applied for sanction to a loan of £960 for the installation of a voltage regulator, and has decided to complete the laying of the l.p. mains between Botany and St. Stephen's Green sub-station at an estimated cost of £792, and to lay a l.p. main between the Memorial sub-station at Hildenborough and Watts Cross at an estimated cost of £350.

Uttoxeter.—SUPPLY TO FACTORY.—The Urban District Council has decided to give a supply of electricity to the biscuit factory of C. H. Elkes & Sons.

Wallasey.—PROMENADE LIGHTING.—The Works Committee has decided to adopt electric lighting for its whole scheme of promenade improvements.

Wallsend-on-Tyne.—CABLE EXTENSIONS.—The Town Council has approved plans submitted by the Newcastle-upon-Tyne Electric Supply Co., Ltd., for the laying of l.p. distribution cables in Hollings Crescent, Burn Avenue, Victoria Avenue, Albert Avenue, Clifton Avenue, Station Road, Douglas Street, and Boundary Street.

Walton-on-Thames.—TARIFF CHANGES.—The Urban District Council has introduced a commercial two-part tariff for heating and cooking at 2d. per kWh between the hours of 4.30 p.m. and 7.30 p.m., and at 1d. per kWh at all other hours, with a meter rent of 5s. per quarter.

SUPPLY DIFFICULTIES.—The electrical engineer has reported that owing to increasing demand in the St. George's Hill area the maintenance of statutory pressure was becoming more and more difficult, and to cope with the demand he was preparing a scheme for the extension of the h.p. main.

Weymouth.—SUPPLY EXTENSION.—The Town Council has decided to lay underground mains for the supply of electricity to the South Hill Estate, Radipole, at an estimated cost of £3,000.

OVERHEAD LINES.—The Ministry of Transport has consented to the erection of overhead transmission lines to supply the parish of Osmington.

Winchester.—COOKER HIRE SERVICE.—The City Council has decided to introduce a scheme for the hire of electric cookers by prepayment meters.

Wimbledon.—GENERATING PLANT.—The borough electrical engineer has submitted an estimate of the cost of the following proposed new generating plant: 7,500-kW turbo-alternator with switchgear and auxiliaries and a 75,000-lb. water tube boiler and auxiliaries. Application has been made to the Electricity Commissioners for consent to install the plant.

Witney.—HIRE-PURCHASE SCHEME.—The Urban District Council has adopted a hire-purchase scheme for electric lighting installations for premises having a rateable value of not exceeding £20.

LATE SHOP-WINDOW LIGHTING.—Electricity for lighting shop windows after closing hours is to be supplied at 3d. per kWh.

Year's Workings.—CORRECTION.—We announced last week in our municipal supply undertakings' reports that the engineers of St. Pancras and Rawtenstall were Mr. J. T. Baron and Mr. C. L. E. Stewart, who filled those positions in past years. The present engineers are Mr. J. E. Shepherd and Mr. R. Lee respectively. Mr. C. G. Morley New is electrical engineer at Cardiff.

Supply in its Infancy

THIS year we have already recorded the jubilees of Callender's, the Electrical Power Storage Co. (now Pritchett and Gold and E.P.S., Ltd.), and Ferranti's. Henley's jubilee also falls later. In our leading columns to-day we refer to the passing of the first Electricity Supply Act in 1882. The lighting of the first country houses by electricity—Hatfield House of the Cecils and Craigside of Lord Kelvin—was also inaugurated in the same year.

Shortly after the passing of the Act supplies for general purposes (*i.e.*, other than for public streets such as Holborn Viaduct, churches, public halls and theatres), were started up in Brighton, Eastbourne and Hastings, all by companies operating without statutory powers. At about the same time, we believe, the New York Edison Company began operations.

Mr. W. N. C. Clinch (engineer and manager, Brighton Corporation) informs us that the original plant at Brighton was housed in Gloucester Road, near the Railway Company's goods yard. The system adopted was the d.c. series-parallel, with groups of lamps looped into the consumers' premises. In 1887 this system was remodelled and high-voltage single-phase a.c. was distributed by overhead cables with transformers on the roofs of the houses.

In 1883 the Corporation, under the Electric Lighting Act of 1882, obtained a Provisional Order authorising it to supply within the borough. No action, however, was taken until 1890, when the first section of the North Road power station was laid down, the plant consisting of Lancashire boilers and small Willans sets, distributing a d.c. supply over a limited area on a two-wire system at 115 V. Some two years later a third wire was added and the supply converted to a three-phase 115- and 230-V system.

Mr. J. K. Brydges (borough electrical engineer, Eastbourne), advises us that the date on which public supply was started in Eastbourne was September 1st, 1882.

On May 1st of that year the Eastbourne Local Board resolved that the parade between Bennett's baths and the Wish Tower should be lighted by 16 electric lamps at a cost of £600, these lamps replacing 90 gas lamps costing £386. It was further resolved that a contract should be entered into with the Eastbourne Electric Light Company to that effect for one year on trial. The lamps were formally switched on at 10.10 p.m. on September 1st. The system used was the Brush.

In 1899 a Provisional Order was taken out, and in the following year the undertaking was acquired by the Corporation.

Mr. A. J. Ryan (borough electrical engineer, Hastings), confirms the first year of working in Hastings as 1882. Brush series dynamos were belt-driven through countershafting by under-type locomotive engines. Lamps in consumers' premises were wired in series at 2,000 V. The company acquired a Provisional Order in 1890 and this was transferred to the Corporation in 1899.

Supply had been given at Chesterfield since September of the previous year for street lighting by incandescent lamps (the first use of such lamps, we believe, for the purpose), and in 1882 a memorial was presented by leading inhabitants urging the Council to take steps to make electricity available for shops and dwelling houses; this in spite of the publicly expressed opinion of one of the leading men on the Town Council that electricity was suitable for lighting only large works and open spaces. Full technical particulars of the plant and mains were given in the ELECTRICAL REVIEW of April 18th, 1882—the first of such descriptions to be published in an electrical journal.

Mention may also be made to the claims of Godalming as a pioneer, as a small non-statutory undertaking for the purposes of street lighting only was, we are informed, initiated there in 1881.

Traction

Croydon.—YEAR'S WORKING.—The accounts of the Tramways Department for the year ended March 31st last show that the total receipts amounted to £117,915 (£126,864 in 1931), while the working expenditure was £111,869 (£112,494), leaving a net loss of £30,392 (£23,816). The number of car miles run decreased from 2,292,134 to 2,284,506, and the number of passengers carried from 20,866,896 to 19,643,050.

London.—RAILWAY ACCIDENT REPORT.—Reporting to the Minister of Transport on the accident which occurred near Hammersmith on June 10th on the Piccadilly tube line of the London Electric Railway, Col. A. C. Trench concludes that the motorman made two mistakes. He misread a new signal which had been in use for five days only. Then, when his train was automatically stopped, he reset his trip gear and started forward again, causing an impact with another converging train.

NOISE ON THE UNDERGROUND.—Complete success has attended the experiment on the Hampstead tube railway of spraying the inside of the tunnel with glue and shredded asbestos for the purpose of reducing the train noise. Provided that the underground authorities are satisfied with the durability of the new tunnel coating, the process will be extended to other parts of the tube system.

NEW TUBE STATION OPENED.—The new Marble Arch tube station was opened to the public on Monday. The station has taken nearly two years to build and cost £200,000. An escalator 70 ft. long replaces the old lifts.

Portrush.—GIANT'S CAUSEWAY TRAMWAY.—According to the *Times* arrangements have been made to celebrate in August, 1933, the jubilee of the Giant's Causeway Electric Tramway. A week's programme has been planned. Mr. W. A. Traill, the present chairman and engineer of the company, was the originator of the scheme for a tramway from Portrush to Giant's Causeway; indeed, he can claim to be the originator of hydro-electric traction as a motive power. Many scientific men will be invited to take part in the celebrations, and especially those associated with railway and electrical enterprises.

Southern Railway.—TRAFFIC HOLD-UP.—The service between Holborn Viaduct and St. Paul's was dislocated for more than two hours on Monday when a piece of steel was dropped on the live rail by bricklayers working on the Fleet Lane bridge.

Sunderland.—TRACK RECONSTRUCTION.—The Town Council is to reconstruct the Tatham Street tramway track and heighten the railway bridge in order to allow double-decker trams to pass. The cost will be £13,580.

Communications

Belgium.—RADIO LISTENERS.—At the end of December, 1931, the number of broadcast radio receiving licences issued had reached 200,531, including 2,753 free licences, which figure represents an increase of 119,381 since December, 1930.

Cupar.—RADIO-TELEPHONY.—The new transatlantic wireless receiving station at Cairngreen, Cupar, Fife, is almost completed, and is about to be occupied by the staff of the P.O., the change being made from the huts at Kemback, where telephony on the long wave has been received from America since 1927. The accommodation provided comprises a large receiver room, rectifier room, measuring room, and a battery room, with rooms for the officer in charge and staff and a workshop. The building at Cairngreen will suffice for a second long-wave channel between London and New York. Arrangements have been made with the Fife Electric Power Company to supply the new receiving station with a.c., which will be used for charging the batteries by means of metal oxide rectifiers, capable of charging at a rate of over 100 A.

Dundee.—NEW TELEPHONE EXCHANGES.—A new telephone exchange which will be opened in Seymour Street, Dundee, next month, is the first step in a local extension scheme. The exchange is the first of three to be built within the next five years. The equipment is automatic and of an ultimate capacity of 2,000 lines. Dundee was one of the first towns in Britain to install an automatic exchange of large dimensions.

Europe.—TELEPHONE PROGRESS.—Notwithstanding her economic difficulties, Europe made telephone progress last year, apart from Germany's decrease. According to the *T. & T. Journal*, France shows an increase of 75,000, Switzerland 26,000, Sweden 24,000, Holland 20,000, Poland 20,000, Belgium nearly 6,000, and Finland 5,600, while in Denmark the Copenhagen Telephone Co. alone increased by 7,000 stations. Great Britain added 84,000 telephones to its total, the largest increase of any country in the world in 1931. Taking into account outstanding returns, one may expect a net increase in Europe of rather over 200,000 telephones, against which must be set the present known decrease in North America of 550,000 stations. As any gains which may materialise in Asia will be more than offset by probable decreases in Australia and other places, there is not much hope of the net decrease of the world's telephones last year being less than 400,000.

Great Britain.—RADIO EXCHANGES.—Glasgow Corporation has decided to take no action in connection with applications from companies to establish broadcasting relay services in the city.

Wireless Services, Ltd., has requested permission to extend its system which is now installed in Torry to the rest of Aberdeen north of the Dee.

Doncaster Town Council has refused to allow Wireless Relay Services, Ltd., and Rediffusion, Ltd., to establish services.

Kent County Council has been asked by the Faversham Town Council and the Thanet Rural Council to give its consent to the placing of wires over county roads for relay services. It will offer no objection provided that no monopoly is granted.

London.—P.O. ORGANISATION.—The Committee appointed to inquire into the constitution and organisation of the Post Office has completed its report and it is now in the hands of the Postmaster-General. The Committee began its investigations early in March, following a manifesto issued by about three hundred Members of Parliament. Important, though not drastic, recommendations are, it is believed, contained in the report.

Newcastle-on-Tyne.—POLICE RADIO.—The utility of rapid radio-telephone communication between headquarters and mobile police patrols is being demonstrated by Chief Constable Crawley in co-operation with Standard Telephones & Cables, Ltd., who designed and manufactured the receiving apparatus. Directly transmission commences a relay causes a lamp on the handlebars of the motor cycle to glow, this being a receiving signal for the driver. He need not stop his cycle engine, but simple turns a key, which transfers the output of the receiver from the lamp to an earpiece, and listens to the message, which is always given out three times. When a passenger is travelling in the sidecar he may, of course, listen all the time, as speech can be received distinctly even while travelling at full speed. The receiver is so small that it will fit inside the sidecar without inconveniencing the passenger to the slightest degree. The receiving aerial consists of a metal strip fixed to the rear of the machine. Interference from the engine has been overcome by careful shielding. The transmitter has been supplied by Standard Telephones & Cables, Ltd. It delivers an unmodulated carrier power of 120 watts to the aerial. It is of the crystal-controlled type, with several stages of low gain. Messages will be sent out on a wavelength of 158 metres. The demonstration is, in general, similar to one given at Bradford on July 13th before Major-General Sir L. W. Atcherley, when the same type of apparatus was used. On this occasion, however, the application is widened by including motor cars and distant police stations.

U.S.A.—TRANSATLANTIC RADIO LINK.—Direct radio telegraph communication between the United States and Hungary is now possible as the result of co-operation between the Hungarian Postal Administration and the Mackay Radio & Telegraph Co. The Hungarian end of the circuit is at Budapest, while traffic at the American end is handled by the powerful Mackay radio station at Sayville, Long Island. Under the new arrangement all classes of service will be available in each direction.

RADIO RECEIVERS.—It is computed that the number of broadcast radio receiving sets in use in America totals 17 millions.

Municipal Tramway and Trolley-bus Undertakings' Results, 1931-32

Town.	Engineer or General Manager.	Total Income. 1930–31.	Total Income. 1931–32.	Working Expenditure. 1930–31.	Working Expenditure. 1931–32.	Net Profit or Loss. 1930–31.	Net Profit or Loss. 1931–32.	Passengers Carried. 1930–31.	Passengers Carried. 1931–32.	Car Mileage. 1930–31.	Car Mileage. 1931–32.
		£	£	£	£	£	£				
Blackburn...	J. H. Cowell ..	93,884	89,383	70,608	66,779	+ 3,938	+ 5,691	15,761,007	15,279,608	1,086,157	1,080,860
Bradford (Trams) ...	R. H. Wilkinson ...	—	474,307	—	407,123	—	+ 30,906	—	—	—	—
,, (Trolley-buses)	R. H. Wilkinson ...	—	119,650	—	113,629	—	+ 19,110	—	—	—	—
Burnley	C. H. Stafford ...	140,747	132,596	121,276	110,215	+ 69	+ 5,683	21,222,423	19,726,921	1,983,789	1,871,413
East Ham...	W. R. Elliott ...	122,343	115,237	104,233	100,105	−11,062	− 10,712	22,961,515	21,699,485	1,968,435	1,955,261
Ipswich	H. E. Blackiston ...	70,681	71,690	52,957	57,048	+ 3,951	+ 367	12,717,775	12,861,276	1,304,334	1,468,963
Liverpool	P. Priestly	1,381,584	1,349,321	1,210,032	1,160.041	+85,577	+120,640	256,789,130	250,987,887	20,903,419	20,242,871
Manchester	R. S. Pilcher ...	1,646,525	1,508,621	1,331,376	1,242,193	+55,909	+ 17,803	292,701,082	269,559,417	22,499,728	20,353,800
Oldham	J. F. Richards ...	40,255	39,952	142,681	137,327	+ 3,076	+ 4,242	28,323,004	28,219,545	2,421,678	2,433,734
Southport	T. I. Kendrew ...	68,395	47,055	52,485	37,320	—	+ 6,097	12,636,672	9,096,833	1,188,038	821,419
Sunderland	C. A. Hopkins ...	120,110	113,680	—	82,742	—	+ 30,886*	29,181,165	27,504,022	1,688,215	1,665,305
Walsall (Trams)... ...	M. J. Somerfield ...	—	30,326	—	22,561	—	+ 215	9,010,076	4,727,516	774,568	424,948
,, (Trolley-buses) .	M. J. Somerfield ...	—	6,372	—	4,355	—	+ 14	—	—	—	—
Wolverhampton... ...	C. O. Silvers ...	181,772	183,905	112,681	117,753	+ 8,177	+ 8,312	25,143,810	25,956,916	2,616,000	2,732,286

* Including petrol buses.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Aldershot.—September 6th. Town Council. Lighting installation of East End Schools. (See this issue.)

Australia. — MELBOURNE. — September 26th. City Council. Totally enclosed metal-clad 6,600-V switchgear. (A.X. 11435.)*

October 4th. Posts and Telegraphs Departments. Switchboard and instrument plugs. (A.X. 11427.)* Instrument cords. (A.X. 11428.)*

October 11th. Condensers. (A.X. 11436.)*

October 25th. Telephone receivers and parts (A.X. 11452)* and telephone transmitters, &c. (A.X. 11453.)*

SYDNEY.—September 26th. Miniature-type control gear for Pyrmont power station. (A.X. 11439.)*

Church Fenton.—Electric lighting installation in Wesleyan Chapel and schoolroom. Mr. F. Stephenson.

Devon.—August 29th. County Council. Traffic signals. (See this issue.)

Dumfries.—August 27th. County Council. Electrical wiring installation work under assisted wiring scheme. Mr. J. S. Pickles, county electrical engineer, Marchmount, Dumfries. Tenders to Mr. J. Robson, county clerk, County Buildings.

East Lothian.—September 12th. County Council. Various works, including electrical installation, at new school, Prestonpans. Messrs. R. and A. K. Smith, 4, Forres Street, Edinburgh.

Edinburgh.—August 27th. Corporation. Heating and electric lighting installation at additions to Stenhouse School. City Architect, City Chambers. Tenders to town clerk.

Galloway.—August 30th. Galloway Water Power Co. Construction of Tongland aqueduct. Sir Alex. Gibb and Partners, Queen Anne's Lodge, Westminster, S.W.1 (deposit £10 10s.).

August 23rd. Foundations and steelwork at Tongland power station. Sir Alex. Gibb and Partners (deposit £10 10s.).

Girvan (AYRSHIRE).—Town Council. Electric lighting at housing scheme. Town clerk.

Hoylake and West Kirby.—August 29th. Urban District Council. Supply and laying of armoured submarine cable to a light on groyne off Meols Parade. Engineer and surveyor, Town Hall.

India.—SIMLA.—October 4th. Four 3-ton level luffing electric quay cranes, portal type. (A.X. 11447.)*

Irish Free State.—DUNDALK.—September 10th. Electrical installation at Ardee Mental Hospital. Messrs. J. P. Tierney & Co., 44, Kildare Street, Dublin (deposit £5 5s.).

Kettering.—September 1st. Electricity Department. Renewal of positive battery plates. (August 12th.)

Leeds.—August 20th. West Riding Mental Deficiency Committee. Electricians' work at Oulton Hall, Oulton. County architect, County Hall, Wakefield.

London. — CENTRAL ELECTRICITY BOARD. — August 31st. Lighting equipment and special fittings for the central control room and offices at Bankside. (See this issue.)

August 30th. Madras and Southern Mahratta Railway Co., Ltd. Lamps. (See this issue.)

Manchester.—August 29th. Electricity Department. Testing equipment and 6,600-V sub-station switchgear. (August 12th.)

New Zealand.—WELLINGTON.—September 27th. Public Works Department. Insulators. (A.X. 11443.)*

Oldham.—September 15th. Public Assistance Committee. Lamps and fittings for the Institution, Rochdale Road. Public assistance officer, Rochdale Road.

Plymouth.—August 29th. Corporation. Electricians' materials, &c. Mr. R. J. Fittall, town clerk, Municipal Buildings.

South Africa.—JOHANNESBURG.—September 15th. City Council. Two 1,080-kVA transformers. (A.X. 11445.)*

September 19th. South African Railways and Harbours. Lamps. (A.X. 11446.)*

CAPE TOWN.—September 14th. Electricity Department. Electrically driven pumping equipment. (G.X. 11715.)*

Southampton.—August 31st. Corporation. Electrically driven centrifugal pump. Borough engineer, 33-35, French Street, Southampton (deposit £3 3s.).

Southend-on-Sea.—September 8th. Electricity Department. H.p. and l.p. cables. (August 5th.)

Stornoway.—September 3rd. Town Council. Wiring for electric lighting at housing scheme. Burgh surveyor, Municipal Buildings, Stornoway.

Sunderland.—September 5th. Corporation. Insulated cable and wire, meters and lamps. (August 12th.)

Swansea.—September 8th. Electricity Department. Steam-raising plant. (July 29th.)

Warrington.—September 5th. Electricity and Tramways Committee. Cables, conduits, and reinforced concrete cable protector slabs and tiles. (See this issue.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Blackburn.—Town Council. Accepted. Electric lighting and power installation at Accrington Road School.—J. Slater.

Doncaster.—Town Council. Accepted. Conduits, switchgear, plugs, &c., for the technical college extensions (£839).—Building & Colliery Supply Co.

Eastbourne.—Electricity Committee. Accepted. Switchgear and transformers for supply to Winkney estate (£4,060).—General Electric Co., Ltd. E.h.p. overhead and h.p. underground cable.—Pirelli-General Cable Works, Ltd. Two h.p. transformers (£129 each).—British Electric Transformer Co., Ltd.

Eccles.—Electricity Committee. Accepted. Meters for twelve months.—British Electric Meters, Ltd.

Guildford.—Watch Committee. Recommended. Automatic traffic signals (£929).—Automatic Electric Co., Ltd.

Ilford.—Electricity Committee. Recommended. One e.h.p. truck feeder cubicle for the Town Hall sub-station (£259).—General Electric Co., Ltd. Truck type cubicle for Clarks Road sub-station (£199), feeder control gear for Parkway sub-station (£82), extension cubicles for Grove Road sub-station (£370) and one 300-kVA transformer (£140).—Crompton Parkinson, Ltd.

Manchester.—Paving Committee. Accepted. Automatic traffic signals.—Forest City Electric Co., Ltd.

Newark.—Notts County Assistance Committee. Accepted. Electric irons at institution laundry (£50).—Harrison & Co.

Reception rooms at "Four Winds" by night, showing fires; the dining room is in the background (see p. 244)

Northumberland.—County Council. Accepted. Installation of electric lighting at the Rothbury Poor Law Institution (£185).—Simm & Richardson.

Sedgfield.—Durham County Assistance Committee. Accepted. Electric washing machine at poor law institution (£68).—North British Engineering & Equipment Co.

Tilbury.—Urban District Council. Accepted. Installation of electric lighting at thirty-nine houses.—Grays Electrical Co.,

Wallasey.—Ferries Committee. Accepted. Electrical installation at booking hall, stage and bridge, &c., at Seacombe Ferry (£1,072).—R. J. Chatham.

Electricity Committee. Accepted. Six 100-kVA transformers (£342).—Metropolitan-Vickers Electrical Co., Ltd. 25 tons of copper.—British Insulated Cables, Ltd.

Forthcoming Events

National Radio Exhibition.—August 19th-27th. Olympia, S.W.

Institution of Mechanical Engineers.—August 19th-September 18th. Canadian summer meeting.

British Association.—August 31st-September 7th. York. Annual meeting.

Institute of Metals.—September 3rd-October 8th. Visit to U.S.A., and Canada, to include annual autumn meeting.

Association of Public Lighting Engineers.—September 5th-8th. Blackpool. Annual meeting and conference.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the name and address of the makers of the following:—

RAPID hair dryer.

RYLAND earthing clip (makers required).

Notes

Generation of Electricity in July

The official returns rendered to the Electricity Commissioners show that 806 million kWh was generated by authorised undertakings in Great Britain during July, as compared with the revised figure of 785 million kWh in the corresponding month last year. This is an increase of 2.6 per cent. During the first seven months of this year the total amount of electricity generated by authorised undertakings was 6,895 million kWh as compared with the revised figure of 6,424 million kWh for the corresponding period of 1931, representing an increase of 7.3 per cent.

K-B Radio

Several hundred visitors from all parts of the country attended the second authorised dealer convention of Messrs. Kolster-Brandes, Ltd., at Sidcup, Kent, on August 10th and 11th. After luncheon at the Cray Works, Mr. S. Wilding Cole, deputy chairman of the company, who presided, remarked that in the past they had not always provided the sets which the public wanted, but, given time, the company hoped in future to cover the whole market. Laboratories in this and four other countries were constantly striving for better results.

He had fought for an earlier show at Olympia and had won by a small majority only. The company had kept 1,200 people employed all the summer and had accumulated large stocks to meet the demand when it came. Two new a.c. sets had been produced (6-valve superheterodyne and 4-valve table models) and two others (a portable and a transportable) were to be introduced (further reference to these sets is made elsewhere in this issue).

Some 200 employés were kept busy in the hire-purchase department in which there were 100,000 accounts. No doubt mistakes had been made; time was needed to train staff for so large an organisation, but a new system was being instituted whereby 15 per cent. deposit would be demanded, with £1 minimum, plus two or three shillings insurance and no change back. The dealer would know the percentage chargeable and once a sale had been made he would have no further cause to worry about it.

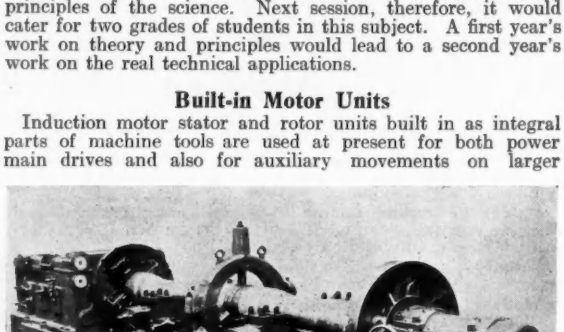
New advertising was being embarked upon and material modifications had been made in the price list. Rebates were to be allowed on all stock, but only to those who signed the authorised dealer's contract.

Electrical School Courses

The Hereford Education Committee reports that a suggestion made by the director of education was carried into practicable form after Christmas, when a special course was opened in electric wiring and installation work. Enrolment proved that there was a strong demand for this technical work and in one case a city tradesman not only came himself, but also brought the whole of his staff. From this work had arisen a further need for some foundation lessons in the elementary principles of the science. Next session, therefore, it would cater for two grades of students in this subject. A first year's work on theory and principles would lead to a second year's work on the real technical applications.

Built-in Motor Units

Induction motor stator and rotor units built in as integral parts of machine tools are used at present for both power main drives and also for auxiliary movements on larger



A high-speed sliding and surfacing lathe

machines. For instance, instead of transmitting power from the main motor to the saddle-traversing or feed motions by means of worm shafts, belts, or other mechanical means, a small motor unit can be built in at the point where power is required.

A motor attached to the outside of the machine tool appears as a clumsy and ugly projection, but, with built-in units, the machine-tool maker can design the motor housing to be in keeping with the rest of the tool and in the exact position to ensure most efficient working, while the rotor may be mounted upon any convenient spindle at any angle desired. Similarly, the control gear, instead of being an attachment, has its housing formed as part of the frame of the machine tool.

A particularly good example of this is seen in the accompanying illustration, which shows a 20-in. centre, electrically driven, high-speed sliding and surfacing lathe by Messrs. Craven Bros. (Manchester), Ltd., each saddle being equipped with one Type WKT, 1½-h.p., 4-pole induction-motor unit manufactured by the British Thomson-Houston Co., Ltd., for quick power traverse.

The motors and the control gear, the latter also manufactured by the B.T.-H. Company, are so intimately incorporated with the saddle construction, that they are practically indistinguishable from the rest of the machine.

Swansea's New Station

Speaking to the students at the Glamorgan Summer Mining School at Swansea, Mr. J. W. Burr, Swansea borough electrical engineer, said that the three large generating stations at Bristol (now in operation), Swansea (in course of construction), and Southampton Water (to be constructed) would generate so cheaply that small industrial producers could not hope to compete. It would not pay colliery companies to produce their own electricity, but he felt certain that because of the cheapness the number of men employed at collieries would be greater than now.

Something like twelve million gallons of water per hour would be needed for cooling purposes for the new Swansea super-station. The boilers, evaporating 240,000 gallons per hour, would be among the largest in the country. Without being unduly ambitious, Mr. Burr stated that the use of anthracite duff as fuel would mean that Swansea would have power produced as cheaply as anywhere else in the world. No other authority would be able to produce it cheaper.

Describing the methods used in sinking the shafts at the station, Mr. Burr said that tubes of freezing mixture were sunk into the earth, with the result that the ground became so solid that it could be cut like cheese. It was a great speeding up factor.

Standard Fuel-oil Specification

The British Standard Specification (No. 209) for fuels for heavy-oil engines that was published in 1924 has recently been under review by the Committee responsible for its preparation, in accordance with the usual practice of the Standards Institution when a specification has been in use for a number of years. As insufficient data are available on the subject, the Committee decided that it would be wiser to postpone the revision of the specification for at least twelve months or until such time as it feels that an adequate specification for performance can be drawn up. In the meantime the Institution of Petroleum Technologists is co-operating in the development of suitable tests which can be included in the specification when it is revised. The Committee would be grateful to users and manufacturers of Diesel engines if they would communicate any experience or comment likely to be useful in arriving at a comprehensive specification for Diesel fuel oils.

Sectional World Power Conference, 1933

The International Executive Council of the World Power Conference has issued a second "Bulletin," giving further information relating to the Sectional Conference to be held next year in Scandinavia. The subject of energy problems of large-scale industry and of transport is grouped under nine heads: energy supply; power and heat combinations; special energy problems of the steam and heat consuming industries; special energy problems of the iron and steel industry; electrical heating; transmission and adaptation of motive power for industrial machinery; railways; city and suburban traffic; and marine transport.

Dr. Axel F. Enström, chairman of the Swedish Organising Committee, and President of the International Electrotechnical Commission, contributes an article in which he points out that the World Power Conference is not intended to be exclusively a meeting of engineers; the aim is to bring together also scientists, business men, and financiers to compare recent experiences in different countries and to discuss the lines along which future development should be directed. Other articles are contributed by T. Nordensson ("Combination of Power and Heat"), Von H. Lundberg ("Steam Heat in Industry"), J. Körner ("City and Suburban Traffic"), Dr. Köttgen, O. C. Merrill, G. Mercier ("Large Dams").

The Bulletin is printed in English, French, and German.

Appointments Vacant

Senior assistant electrical engineer for Newcastle-upon-Tyne Electricity Supply Co., Ltd.

Meter and instrument tester for Preston Electricity Department.

(See our advertisement pages to-day.)

The Manor Boiling Plate

In our issue of August 12th we published an account of the modified boiling plate made by the Manor Electric Oven and Fire Co. We are now able to supplement the information there given by reference to a striking feature of this plate which is that with the switch in "medium" position, two-thirds of the total loading (approximately 1,065 W) is given on the four centre sections only, without dissipation of heat to the rest of the plate. This arrangement gives the advantages of a small plate for efficiently carrying out such minor operations as egg and milk boiling combined with a larger plate for heavier duty. The efficiency of the four centre sections only when boiling half-a-pint of water is reported to be 45 per cent.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. A. J. Hollington, who has joined Collins Electrical, Ltd.

Mr. A. J. Hollington, formerly with the Morgan Crucible Co., Ltd., has joined the staff of Collins Electrical, Ltd. He will represent the company along the South Coast as far as Bournemouth, and also in the counties of Essex, Surrey, Sussex, and Kent. Communications to him should be addressed either to the company's head office, 115, Clerkenwell Road, E.C., or to "Pailin," 46, Furn Lane, Purley.

The marriage took place at Holy Trinity Church, Macclesfield, on August 11th, of **Mr. Kenneth Leslie Howard,** son of Mr. Henley L. Howard, of 27, Glenesk Road, Eltham, S.E., managing director of the Electricity Company of Macclesfield, Ltd., and Miss Mabel Kenning Hinton, daughter of Mr. A. J. Hinton, of Station Road, Stafford. The bridegroom was formerly connected with the Electricity Company of Macclesfield, Ltd., and is now in charge of a station at Porthcawl.

Mr. G. Scott Ram, O.B.E., M.I.E.E., has accepted the invitation of the Board of Control to continue as president of the Association of Supervising Electrical Engineers for a further year.

Mr. S. E. Dracup, of the Lincoln City Electricity Department, who was recently married, was presented by his colleagues with a canteen of cutlery.

Mr. F. H. Davies has again joined the staff of Messrs. O'Brien & Hulme as outside representative for wireless and electrical goods.

Mr. H. Scholey, C.B.E., A.M.I.E.E., who has been for some years engaged in the development of special types of synthetic resins, has taken a London address at 91, Victoria Street, S.W.

A *Reuter* message from Ottawa states that **Lord Ashfield,** United Kingdom representative on the Federal Royal Commission on Transport Problems, recently arrived for the Commission's meeting which was to be held on Tuesday last, when the concluding preparations for the final report were to be made.

Mr. Vernon Walker, whose article on "Dew Point Temperature" appears on page 243 of this issue, is the assistant resident engineer at Bury Corporation electricity works. He is keenly interested in the subjects of pulverised fuel and dew point measurement of flue gas, of which he has made a close study, and he has contributed a number of articles on these subjects to our pages during the past few years. Mr. Walker is an associate member of the Institution of Electrical Engineers.

Mr. Vernon Walker, assistant resident engineer at Bury

Mr. M. W. Singer, M.Sc.Tech., A.M.I.E.E., has left Steatite and Porcelain Products, Ltd., and has taken up the position of sole agent in Great Britain (with the exception of the London area) for Messrs. George Wade & Son, Ltd., of Burslem. He has also been appointed agent for Pyrex brand overhead line insulators manufactured by James A. Jobling & Co., Ltd., Sunderland. His address is 18, York Road, Edgbaston, Birmingham.

Colonel R. E. B. Crompton, C.B., R.E., and **Sir Hugo Hirst,** Bart., have been elected honorary members of the Batti-Wallah's Society. The Committee has power to elect two honorary members per annum with an ultimate aggregate of ten, and its first choice has fallen upon these two well-known gentlemen. Col. Crompton was a naval cadet in the Crimea and Sir Hugo Hirst is a yachtsman and an all-round sportsman. Both have written characteristic letters accepting the honour. Messrs. Norman Aish and James McCaffery, O.B.E., have been elected members of the Society.

Mr. E. A. Boyd, formerly of Messrs. G. V. Twiss & Partners, consulting engineers, and chief engineer to the British Power and Light Corporation, Ltd., is opening offices at 3, Middle Temple Lane, E.C.4, as consulting electrical engineer specialising in transmission, distribution, d.c. to a.c. change-overs, and bulk supply problems.

Mr. H. White has been appointed by Wakefield Corporation Electricity Committee as commercial engineer to assist also with mains and distribution at a salary of £445.

Obituary

Mr. J. C. Miller.—A well-known figure in electrical circles, Mr. James Cormack Miller died at his residence at Gosforth, Newcastle-on-Tyne, on August 12th. At an early age Mr. Miller went to U.S.A. with his parents and was apprenticed to the General Electric Co. of Schenectady. He afterwards returned to England and joined Messrs. J. H. Holmes & Co., and the Newcastle Corporation Tramways Department. He then joined the British Thomson-Houston Co., Ltd., of Manchester, and was responsible for the installation of many electrical cotton mill equipments. He was later appointed illuminating engineer at Newcastle-on-Tyne and was responsible for many large lighting schemes, notably Durham Cathedral and the general illumination of the North-East Coast Exhibition. The funeral took place on Monday, August 15th.

Mr. F. Hatch.—The death has taken place at the age of sixty-eight years of Mr. Frank Hatch, who was for many years associated with the Potteries Electric Traction Co. He was formerly general manager of the Dudley-Wolverhampton tramways, and afterwards went to Stoke-on-Trent as assistant general manager of the Potteries Electric Traction Co. At the time of his death he held the position of claims superintendent. He had been a member of the Stoke-on-Trent City Council since 1926, and was a life governor of the North Staffordshire Royal Infirmary.

Mr. H. J. Wilson.—The death is announced of Mr. Harry James Wilson, Deputy Chief Inspector of Factories since 1923, which occurred on August 11th at Orpington, at the age of sixty-two years. He was appointed H.M. Inspector of Factories in 1892, became Deputy Superintending Inspector for Scotland in 1907, and Superintending Inspector for Scotland in 1916.

Mr. D. Willock.—We regret to record the death of Mr. David Willock, secretary of the Electric Construction Company, Limited. Mr. Willock joined the company in 1897. In 1902 he was appointed secretary, and in 1915 was elected to a seat on the board. His services were highly esteemed by the company, and he enjoyed much popularity in the electrical industry, where he was intimately known.

Mr. J. H. Collings.—We learn with deep regret of the death which occurred on Monday last, after a very brief illness of Mr. John Hillary Collings of the General Electric Co., Ltd. We well remember Mr. Collings as one of the early band of young men who formed the nucleus of the staff of the company which he served for over forty years right until the end. In the early days he compiled the first lighting fittings catalogues issued by the company, and his work was marked by great originality. He was the inventor of many patent electrical "gadgets"—which he perfected in his private workshop. Included among them was the "two-way" plug adaptor for use with irons, toasters, &c. In later years his work brought him closely into touch with architects, consultants, contractors and supervising engineers. He was a man of tact, geniality and good temper. He was present at every one of the seventeen annual conventions of the E.C.A. He was sixty years of age. We shall be expressing the feelings of a host of electrical friends when we tender sincere sympathy to Mrs. Collings, her son, and two daughters, in their bereavement. The funeral takes place to-day (Friday), at 2.30 p.m. at the City of London Cemetery, Manor Park.

Mr. G. W. Lorimer.—The death is reported of Mr. George W. Lorimer, inventor of the automatic telephone dialing system, which occurred recently at his home in Tray, Ohio.

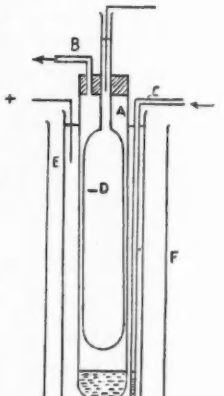
World Aluminium Production

The Metall Gesellschaft of Frankfort-on-Main has just issued its well-known statistics concerning the production of lead, copper, zinc, tin and aluminium, &c. The world production of aluminium, which only amounted to 68,600 metric tons in 1913, is stated to have been 217,600 tons in 1931 as compared with 267,000 tons in 1930, and 276,800 tons in 1929, which was the record year. In the case of the consumption, which at 66,100 tons in 1913 closely approached the output of the metal in that year, this is returned as having amounted to 175,300 tons in 1931 as compared with 209,700 tons in 1930 and 276,000 tons in 1929, which was the year of greatest consumption. According to reports from other sources, the production of aluminium last year was increased only in two countries, namely, Great Britain and Italy. It is also stated that the aluminium syndicate, or the individual members, make reductions in the official prices in case of need so as to stimulate the sales.

The Electrical Improvement of Oils and Fats

IN recent years a considerable amount of research has been directed to the problem of devising an economical process for the electrical treatment of vegetable oils, and also resins, in order to make them more suitable for use in the manufacture of paints, especially in the way of improved drying properties.

The effect of an electrical glow discharge on the characteristics of vegetable oils is remarkable. Changes take place in their viscosity, acidity, molecular weight, and density, all of which increase, whilst the iodine value decreases; the saponification number remains about the same; and the stearic acid content is also increased. The theory propounded in explanation of these various chemical and physical changes is that the hydrogen atom in the oil molecule is made extremely active under the impact of ions and electrons, so that new carbon double bonds are formed, leading ultimately to the polymerisation of the molecule and the formation of saturated groups, such as stearic and oleic acids.



Oil treating vessel

The electrical treatment of oils and fats has been developed along two lines: (*a*) in the manufacture of lubricating oils, *e.g.*, "Voltol," by subjecting mixtures of fatty and mineral oils to a glow discharge, or the like, and (*b*) the use of the hydrogen formed thereby for purposes of hydrogenation, *e.g.*, fat-hardening. The effect of such treatment on the oils from a paint-making point of view has not hitherto received much attention, possibly on the ground of expense and because also the ordinary thermal method had proved very satisfactory. During the last year or so, however, the Lobositzer A.G. has undertaken a great deal of research in this direction, and some of the results are reported by Mr. P. Slansky in *Farben Zeit.*, 1932, 37, 1419-20; see also L. Hock, *Zt. f. Elektrochem.*, 29, 111 (1923), and E. Eichwald, *Zt. f. ang. Chem.*, 35, 505 (1922).

If the changes which take place in vegetable oils after exposure to electrical treatment are compared with those occurring after heat treatment in the absence of air, very close similarity will be found. In both cases the viscosity, molecular weight, and refraction are higher, and the iodine number lower; therefore polymerisation must take place, involving the formation of a colloidal system or aggregation. But the chemical reactions due to electrical treatment differ in two important respects from those resulting from high-temperature heating without air. In the first place, as a result of the glow discharge method, there is a formation in the oil of saturated compounds, *e.g.*, stearic acid, and, secondly, new double bonds of unsaturated groups appear, leading to marked polymerisation or aggregation.

These two structural modifications, which are not observable in the heat treatment of oils, must obviously affect the drying properties of the oil in opposite ways; that is to say, the formation of stearic or oleic acid is unfavourable, whilst the new double bonds are favourable to improved drying properties. It follows, therefore, that if electrical treatment could be carried out in such a way that the formation of stearic or oleic acid is avoided, the result would be the production of polymerised or stand oils of superior drying qualities.

Attempts made to carry out the process in this way have been successful, and the thickened oils so obtained have been found to be superior to those obtained by thermal treatment. The apparatus used is of a very simple description, as will be seen from the accompanying sketch. As large a surface as possible of the oil is exposed *in vacuo* to a high-voltage alternating current between two electrodes; A is a rubber stoppered closed glass vessel, which can be evacuated through the tube B, containing the oil to be treated. Air may be admitted to vessel A through the tube C for the purpose of stirring up the oil. Two glass vessels filled with common salt solution serve as electrodes (D and E), so that the discharge takes place in vessel A between these electrodes. The large glass enclosing vessel F acts as a thermostat and contains the whole.

The chief consideration in operating this apparatus is speed of reaction, if the formation of oleic and stearic acids is to be entirely avoided and the oil suitably thickened. This is best achieved by using a large potential with maximum exposure of oil surface. The energy used should be at least 1,000 W per kg. of oil. Large surface exposure is best obtained by air blast (through the tube C) or by blowing in other gases, such as nitrogen or carbon dioxide. By using 7,000 V and a rather high frequency (600 cycles per second) linseed oil can be thickened in two hours to the consistency of a stand oil with exceptionally good drying and other paint properties.

With regard to the effects of other conditions, it has been found that (*a*) the effect of other gases than air or oxygen (*i.e.*, nitrogen or carbon dioxide) is to increase the drying time and (*b*) the use of a catalyst, such as oil-soluble metallic compounds, and also the use of higher temperatures (up to 100 deg.) do not accelerate the process.

A similar method can be used for greatly improving the drying properties of resins, such as glycerin esters, colophony, cumaron resin, &c. These could be dealt with either in a melted state, in linseed oil solution, or other suitable solution.
—H. L. RAMSEY.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Radio Furniture and Fittings, Ltd.—Private company. Registered August 15th. Capital £100 in £1 shares. Objects: To carry on the business of manufacturers of radio and radio-gramophone cabinets and accessories, &c. The directors are: W. B. Scott, Farleigh, 309, Kenton Road, Harrow; P. J. Franchi, 141, Chamberlayne Road, Kensal Rise, N.W.; and G. Campling, 7, Park Hill, Bickley, Kent. Registered office: Canal Works, Park Royal, Willesden, N.W.2.

Corecton Radio, Ltd.—Private company. Registered August 13th. Capital £4,000 in 1,500 7½ per cent. participating preferred shares of £1 each and 50,000 ordinary shares of 1s. each. Objects: To carry on the business of manufacturers, importers and exporters of, agents for and dealers in wireless, &c. The permanent directors are: H. W. B. Hansford, The Apex, West Drayton Road, Hillingdon, Middlesex; and J. W. Underwood, "Montrose," Corwell Lane, Hillingdon, Middlesex. Solicitors: Heald, Johnson & Co., 129, Wardour Street, W.1.

Norvall Brothers, Ltd.—Private company. Registered August 8th. Capital, £2,000 in £1 shares. Objects: To carry on the business of electrical and mechanical engineers, &c. The directors are: G. H. Norvall, 9, Dynevor Road, Stoke Newington, N.16, and E. Norvall, 119, Wargrave Avenue, South Tottenham, N.15. Registered office: Victoria Grove Works, Victoria Grove, Stoke Newington, N.16.

Walsall Instruments, Ltd.—Private company. Registered August 10th. Capital £1,000 in £1 shares (500 preference and 500 ordinary). Objects: To carry on the business of manufacturers' merchants and factors of electrical and mechanical instruments, apparatus and appliances, &c. The permanent directors are: J. H. Beckett, 148, Bath Road, Walsall, engineer; and R. E. Beckett, 41, Charlotte Street, Walsall. Solicitors: Loxton & Co., Walsall.

Oxlade & Ryan, Ltd.—Private company. Registered August 11th. Capital £500 in £1 shares. Objects: To carry on the business of wireless, radio, electrical, gramophone and mechanical engineers, &c. The directors are: L. R. Ryan (permanent), Rose Tree Cottage, Marlow; and K. F. Oxlade, 89, London Road, High Wycombe. Secretary: A. Ryan. Registered office: 89, London Road, High Wycombe.

British Permel Enamelled Wire, Ltd.—Private company. Registered on August 11th with a nominal capital of £10,000 in £1 shares. Objects: To adopt an agreement with the Permel Enamelled Wire Manufacturing Co., Ltd., to manufacture and deal in wire of all kinds and all machinery required for use in connection therewith. The directors are: G. L. Wates, Rowhill Grange, Wilmington, Kent; A. P. Pyne, 7, Kidbrook Park Road, S.E.3; L. Hubert, Lovohaz utca 30, Budapest II; and J. Hubay, 33, Tugligeti ut, Budapest I. Registered office: Columbia House, Aldwych, W.C.2.

Associated Radio Distributors (Yorkshire), Ltd.—Private company. Registered August 9th. Capital £500 in £1 shares. Objects: To carry on the business of retailers of wireless receiving sets and components, &c. The directors are: C. Lister, 5, Priory Place, Doncaster; and Mrs. Sybil F. Howcroft, 1, Hillcrest Road, Doncaster. Secretary: C. Lister. Registered office: 22, Priory Place, Doncaster.

B. R. S., Ltd.—Private company. Registered August 12th. Capital £100 in 5s. shares. Objects: To carry on the business of manufacturers of and dealers in dynamos, motors, magnetos, batteries, lamps, &c. The subscribers are: J. S. Bliss, 28, Crusoe Road, Mitcham; and P. A. Bax, 3, Bolton Road, W.4. Registered office: 315-319, Queen's Road, Battersea, S.W.

Returns of Electrical Companies

British Dynamic Reproducers, Ltd.—Capital £500 in £1 shares. Return dated December 31st, 1931 (filed April 21st, 1932). 500 shares taken up. £2 paid. £498 considered as paid. Mortgages and charges, nil.

Crauford & Frost (Wireless), Ltd.—Capital £3,000 in 2,500 preference shares of £1 and 4,000 deferred shares of 2s. 6d. Return dated December 31st, 1931 (filed June 23rd, 1932). 1,700 preference and 4,000 deferred shares taken up. £1,200 paid on

1,200 preference shares. £1,000 considered as paid on 500 preference and 4,000 deferred shares. Mortgages and charges, nil.

C. C. Pudney & Co., Ltd.—Capital £6,000 in £1 shares. Return dated November 3rd, 1931 (filed March 29th, 1932). All shares taken up. £3,560 paid. £2,440 considered as paid. Mortgages and charges, nil.

Alfred Vernon Power & Engineering Co., Ltd.—Capital £1,000 in £1 shares. Return dated January 13th, 1932 (filed May 10th, 1932). 999 shares taken up. £152 paid and £847 considered as paid. Mortgages and charges, nil.

Natural Power, Ltd.—Capital £1,500 in 1,250 shares of £1 and 5,000 shares of 1s. each. Return dated March 25th, 1932 (filed May 12th, 1932). 327 £1 and 5,000 1s. shares taken up. £327 paid on the £1 shares. £250 considered as paid on the 1s. shares. Charges, none registered.

Junit Manufacturing Co., Ltd.—Capital £2,000 in £1 shares. Return dated December 15th, 1931 (filed April 23rd, 1932). All shares issued and fully paid up. Mortgages and charges, none registered.

Norwich Wireless Co., Ltd.—Capital £1,000 in £1 shares. Return dated October 19th, 1931 (filed April 29th, 1932). 794 shares taken up. £794 paid. Mortgages and charges, none registered.

Zelco, Ltd.—M. Weiner, 53, Farringdon Road, E.C., ceased to act as receiver and manager on August 10th.

Spencer Radio, Ltd.—Debenture dated August 8th to secure £6,000 charged on the company's property, present and future, including uncalled capital. Holder: M. H. Adams, 26, Manor Way, Finchley.

Eric J. Lever (Trix), Ltd.—Debenture dated August 5th to secure £750 charged on the company's undertaking and property, present and future, including uncalled capital. Holder: D. A. Lyons, 21, Shirehall Close, N.W.7.

Electrical Trading Association, Ltd.—Capital £10,000 in £1 shares. Return dated May 17th, 1932. 2,502 shares taken up. £2,502 paid. Mortgages and charges, nil.

Reliance Electrical Co., Ltd.—Capital £500 in £1 shares. Return dated December 31st, 1931 (filed March 29th, 1932). 300 shares taken up. £150 (10s. per share) called and paid up. Mortgages and charges, nil.

Mather & Platt, Ltd.—Capital £2,500,000 in 40,000 preference shares of £10, 1,460,000 ordinary shares of £1, and 640,000 unclassified shares of £1 each. Return dated March 11th, 1932. 40,000 preference and 1,363,660 ordinary shares taken up. £630,660 paid on 29,200 preference and 338,660 ordinary shares. £1,133,000 considered as paid on the remainder. Mortgages and charges, nil.

W. E. Dove & Co., Ltd.—Capital £3,500 in £10 shares. Return dated March 7th, 1932. 320 shares taken up. £2,000 paid. £1,200 considered as paid. Mortgages and charges, £800.

British Insulated Cables (S.A.), Ltd.—Capital £2,000 in £1 shares. Return dated March 17th, 1932. All shares taken up. £2,000 paid. Mortgages and charges, nil.

Seaton & District Electric Light Co., Ltd.—Capital £10,000 in £1 shares. Return dated March 26th, 1932. All shares taken up. £10,000 paid. Mortgages and charges, £5,200.

E. Steventon & Co., Ltd.—Debenture dated July 16th to secure £150, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Mrs. L. Bradbury, 16, Aberdeen Road, Croydon, Surrey.

Burt, Escare & Denelle, Ltd.—Debenture charged on leasehold premises No. 49, Berwick Street, Soho, and company's undertaking and property, present and future, including uncalled capital, dated July 29th, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd.

Salaman Handoll, Ltd.—Particulars filed of not more than £5,000 debentures authorised July 12th, charged on company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £2,950.

Eric J. Lever (Trix), Ltd.—Debenture dated July 21st, to secure £750, charged on company's undertaking and property, present and future, including uncalled capital. Holder: S. J. B. Lancashire, 28, Hartley Road, Leytonstone, Essex.

Consolidated Radio Co., Ltd.—Particulars filed of £12,000 debentures authorised July 6th, 1932, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £6,900.

City Notes

The Radio Corporation of America, in its half-yearly statement, shows a gross income to June 30th last of $36,542,163, as compared with $47,973,727 in the first six months of 1931, and a net income of $3,598,508 ($7,428,714). After providing for interest, depreciation, &c., and paying a dividend on the "A" preferred shares, there was a deficit for the period of $123,613, which is deducted from the surplus at January 1st last, leaving a surplus at June 30th of $11,204,176.

Parkinson & Cowan, Ltd.—Presiding at the annual meeting on August 12th, Lt.-Col. H. W. Woodhall (chairman and managing director) said in the course of his speech that the larger portion of the depreciation was consequent upon their decision to close down the operations of Domestic Electrification, Ltd., which had made losses since its formation in 1927. Although it was conceivable that this company might ultimately have been made a success, they felt that it was wiser not to run the risk of further losses, and that in any case the money and energy required for the purpose could be better employed in other directions. With regard to reserve for unpaid dividends, &c., the position was as follows: In 1929, and again in 1930, dividends amounting to £10.605 and £7.385 respectively, a total of £17,990, were earned by Electricity Meter Manufacturing Co. of Sydney. Credit was taken for these sums in the profit and loss accounts of the parent company for those years. A sum of £3,535 only had in fact been received to date, and, as the balance of £14,455 had been absorbed into the working capital of E.M.M. Co., there was not much probability of the amount owing being released and remitted in the near future.

Davis & Timmins have announced an interim dividend of 3s. per share on the ordinary shares.

The South Metropolitan Electric Light & Power Co. has declared interim dividends on the 7 per cent. cumulative first preference and 6 per cent. cumulative second preference shares.

The Southern Brazil Electric Co.—A meeting of debenture holders was held on August 11th when resolutions were approved for the suspension of the annual redemption payments and for a reduction of interest.

The Telsen Electric Co., Ltd., held its annual meeting on August 10th. Mr. J. W. Murray (chairman), who presided, said the business was converted from a private company into a public company in May last. The extensions to their main works, covering some 75,000 sq. ft., had been completed. Mr. Macnamara, the managing director, had stated that during the coming season upward of 4,000 additional workers would be employed. Every indication pointed to a further great expansion in the demand for their products during the coming season. The growth of the radio industry in this country, and upon which industry their principal activities were at present centred, had been phenomenal, but the industry had not reached, and was unlikely for many years to reach saturation point. Their future policy was to build up a strong and liquid reserve, and to strengthening and consolidating their position in order to meet the keenest competition, and to be prepared with ample resources to enter, if considered advisable, the market for electrical equipment in other directions.

The Bognor Gas & Electricity Co., Ltd., has announced dividends at 5 per cent. per annum on the ordinary and additional "A" consolidated stocks, 9 1-5 per cent. per annum on the "B" consolidated stock, and 7 per cent. per annum on the new consolidated stock, all less tax, for the half-year.

The Canadian General Electric Co. has declared a quarterly dividend on the common stock of $1 per share for the quarter ending September 30th.

Waygood-Otis, Ltd., has announced an interim ordinary dividend of 12½ per cent., less tax (against 7½ per cent.).

Companies to be Struck off the Register.—The names of the undermentioned companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary:—

Sale Electric Co., Ltd.
Southern Wireless, Ltd.
Wholesale Electric Supply Stores, Ltd.

Stocks and Shares

TUESDAY EVENING.

STOCK Exchange prices are fluctuating in a manner which allows plenty of scope for the in-and-out dealing beloved by speculators, of whom many, however, are still away holiday-making. In spite of their absence, a good deal of animation prevails. Investment stocks and speculative shares alike attract attention. The aftermath of the Five per cent. War Loan conversion scheme is seen in a continuance of investment of money into safety first, as well as in other less front-rank, stocks. The supply available to meet demand is restricted by reason of the ban that still lies upon new issues. One of the outstanding features is again the strength shown by Americans, and the continuance of the bullish tendency lately developed by New York. The striking success of the War Loan Conversion scheme has acted as a spur to general business in the Stock Exchange.

American Recovery

American Telephone & Telegraph stock is one of the leaders of the market in the Industrial section concerned with American Utilities. After touching 165¼, and showing 60 points rise within the last three weeks, the price went back to 157½. The rise which was started through purchases in New York by a few British Trust Companies impressed with the extreme severity of the fall that had occurred in Americans has had for its assistance the aid of American buyers, no longer obsessed by the conviction that prices could move only downwards. Without any genuine improvement in American trade, the stock market in New York has gone violently ahead, politics no doubt playing some part, through the consideration that a bullish market will favour the Republican Party of which President Hoover is the head, while dull and stagnant markets would enhance the chances of success in the Democrats' camp. International Telephone & Telegraph stock is 4¼ up at 16¼. Amongst other dollar issues, City Services preferred shares at 40 are 20 points higher than they stood a fortnight ago. Montreal Light & Power improved a little to 43, Shawinigans are 1 up at 19, while Power Corporation shares eased off to 11. Hydro Electrics jumped to 9¼, and the preferred, which are relatively cheaper, have put on a point to 6¾.

Cables and Wireless

Cables & Wireless 5½ per cent. preference has spurted 4 points to 65¼, and the "A" ordinary is 3¼ up at 23 on vague, but apparently confident, expectations that an announcement respecting agreement with the Post Office is to be published shortly. There has recently been a good deal of absorption of the stocks; fresh demand, coming in, found little supply available to meet it. In sympathy, Globe ordinary rose 25s. to 8¼,

and the preference 5s. to 10½. If the Ottawa Conference results in a quickening of business relations between the various countries in the Empire, this, it is argued, should prove a great stimulus to communication traffics. Marconi Marines have strengthened to 30s.

Anchor Cable 4½ per cent. debenture stock has risen to 100, Western Telegraph 4 per cent. debenture stock to 90. A gain of 5 points lifted Western Union common shares to 50.

Shareholders and Their Shares

It is of interest to notice that the number of individual shareholders of the International Telephone & Telegraph Company is now the highest number in the history of the Corporation, namely, 100,745. Little more than ten years ago the number was 846. The figures of the American Telegraph & Telephone shareholders are still more amazing, the company having no fewer than 644,903 proprietors on its books. Of these, four-fifths of the number own 25 shares or less. So greatly has the practice grown of late years in America of small investors holding what are described as "odd lots" that such figures as these can probably be supplemented by others of similar nature, though it may be doubted whether many companies can boast of a proprietary such as that of the American Telephone and Telegraph Company. The number of accounts in the Bank of England books in respect of the Five per cent. War Loan is a little over 2,400,000.

Manufacturing and Equipment

British Insulated ordinary have strengthened to 3½, and General Electric ordinary are the pence higher at 42s. 6d. Callender's preference improved to 27s. 6d., showing a gain of 1/16, but the ordinary at 57s. 6d. are equally easier. Telegraph Constructions strengthened to 10½. British Aluminium are 1s. 9d. better at 23s. 9d. Crompton Parkinson's at 18s. 9d. have gained 1/16. There has been, during the past few business days, such a general rise in the prices of commodities and base metals as to encourage the expectation of that all-round revival in trade which such a movement is expected to herald. The greater confidence has brought about rises in coal, iron and steel shares; Vickers, for instance, advancing to 6s. 9d. Amongst the prominent features of the industrial market, Electrical & Musical Industries stand out noticeably. The shares were quoted at 10s. a few weeks ago, but have suddenly come to life, and the price was rushed up to 16s. 3d. before reaction to 15s. occurred. The Radio Corporation has issued its half-yearly statement, in which the gross income figures at 36½ million dollars, being nearly 11½ million dollars less than that in the corresponding period of 1931. Severe cuts have been made in expenses, but the net income, after all deductions, is $219,406, showing a decline of $2,419,000 as compared with the first six months of 1931.

Electricity Supply Issues

No change of any consequence has occurred in the list of Home Electricity Companies. Prices of the London shares are maintained at a level which gives 4¼ to 4⅜ per cent. return on the money. Central Electricity 4½ per cent. scrip has rallied to 7 premium, showing a gain of 3 points on the week. West Gloucestershire Power 6½ per cent. preference is 2 up, at 80½.

In the Colonial group, Victoria Falls are better at 68s. 9d. Amongst foreign bonds, a rise of 4 points lifted Tokyo Electric sixes to 73.

There is on offer at the present time a moderate amount of London General Omnibus 5 per cent. cumulative income debenture stock at 108½. Interest is payable on the 15th of February and August, and the stock is redeemable at 100 on June 30th, 1962. The directors have the right to repay the stock on any earlier interest-payment date at 107½, at which price the stock is repayable in the event of voluntary liquidation for reconstruction or amalgamation. Ahead of this stock stands the company's 4½ per cent. first debenture. The price is about 106, and the interest service requires £100,000 per annum. The income debenture stock takes, for its interest, a yearly £200,000. For 1931 the available profit came to £1,118,000. Both stocks are charged upon the London Traffic Pool, which came into being, it will be remembered, in 1915, under the title of the London Electric Railway Companies Facilities Act, 1915. The contributions to the Pool have risen from £820,000 in 1924 to £1,026,000 in 1931.

Home Railway Stocks

Central London Railway ordinary stock at 55½ and the deferred at 57½ are both 5 points higher. The preferred stock has risen 2 to 51. Meanwhile, the prices of the assented stocks remain at 82½. The reason for the demand for the former trio is the assumption that the disparity between the two sets of prices, assented and non-assented, is over-wide, and there is no justification for there being so much difference. With investment keen set to pick up cheap stock, the discrepancy is being redressed in favour of the lower-priced issues. London Electric Railway ordinary has strengthened to 57½. District is harder at 58½. Underground ordinary shares remain at 18s. Metropolitan Railway stock is unchanged at 80. In the traction group, London and Suburban preference at 9s. 6d. show a slight advance.

Of the overseas shares, Cape Electric Trams came into request and rose to 10s. An enormous turnover in Brazilian Tractions—now amongst the most popular gambling-counters in the Stock Exchange—left the price ⅛ down at 13¼.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price. Aug. 16.	Rise. or Fall.	Yield. p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	70/-xd.	—	4 5 9
Brompton Ordinary	1	8½	8½	32/-	—	4 7 6
Central Electricity 4½% Deb.	Stock	4½	4½	102½	—	4 7 10
Charing Cross Ordinary	1	8½	8½	32/-	-6d.	4 7 6
Chelsea	1	8⅞	8⅞	32/-	—	4 7 6
City of London	1	10	10	42/6	—	4 14 1
Clyde Valley	1	8	7	30/-	—	4 13 4
County of London	1	11	10½	47/6	—	4 8 5
Edmundsons' 7% Pref.	1	7	7	29/-	—	4 16 7
Elec. Dis. Yorkshire	1	9	9	38/3	—	4 14 1
Elec. Supply Corporation	1	11	11	52/6	—	4 3 10
Kensington Ordinary	1	8	8	33/-	—	4 4 10
Lancs. Light and Power	1	6½	7	28/9	—	4 17 5
London & Home Counties 4½% Deb.	Stock	4½	4½	106½	—	4 4 6
London Electric	1	9	9	32/6	—	4 6 2
Metropolitan	1	10	10	45/-	—	4 9 0
Midland Counties	1	7	7	31/3	—	4 9 7
Mid. Elec. Power	1	8	8	33/3	—	4 16 9
Newcastle-on-Tyne Ordinary	1	6	6	25/-	—	4 16 0
Do. 7% Pref.	1	7	7	31/-	—	4 10 4
Northampton	1	10	10	45/-	—	4 9 0
Notting Hill 6% Pref.	10	6	6	12½	—	4 16 0
North Met. Elec. 6% Pref.	1	6	6	28/6	—	4 4 3
St. James' and Pall Mall	1	8	8	32/-	—	4 7 6
Scottish Power	1	8	—	31/3	—	5 2 5
South London	1	8½	8½	32/-	—	4 7 6
Urban Ordinary	1	7	—	28/9	—	4 17 5
Westminster Ordinary	1	8½	8½	33/-	—	4 4 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	16/3	—	9 4 8
Yorkshire Elec.	1	8	8	37/-	—	4 6 6
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	82½	—	4 17 0
Metropolitan	„	3½	2½	60	—	4 3 4
Do. District	„	5	4½	58½	+1	7 13 10
Underground Electric	1	8	7	18/-	—	7 15 7
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	157½	-1	5 14 3
Anglo-Am. Tel. Pref.	Stock	6	6	102½	—	5 17 1
Do. Def.	„	1½	1½	24	—	6 5 0
Cables & Wireless 5½% Pref.	„	5½	2⅝	65½xd.	+4	4 8 0
Do. A 7½% Ord.	„	—	Nil	23	+3½	—
Do. B Ord.	„	—	Nil	9½	+1	—
Globe Tel. and T. Ord.	10	8½	Nil	8½	+1½	—
Do. do. Pref.	10	6	6	10½	+½	5 14 3
Great Northern Tel.	10	20	20	25½	—	7 17 0
Marconi-Marine	1	15	10	30/-	+1/-	6 13 4
Oriental Telephone Ord.	1	12	12	2½	—	*4 16 0
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	—	—	3/9	—	—
Do. do. 2nd Pref.	5	—	—	3/9	—	—
Do. do. 5% Deb.	Stock	—	—	7	—	—
British Electric Traction Def. Ord.	„	5	5	300	—	—
Do. do. Pref. Ord.	„	8	8	133½	-2	5 19 10
Brazil Traction	100	—	—	13½	-⅛	—
Brit. Columbia Elec. Rly. Pfd.	Stock	5	5	99½	—	5 0 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	9/6	+9d.	—
London United Tram Deb.	Stock	4	4	62½	—	6 8 0
Mexico Trams, 5% Bonds	—	5	5	22½	—	30 5 10
Mexican Light Common	100	Nil	Nil	14½	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	54½xd.	—	9 2 0
Victoria Falls Ord.	1	15	15	68/9	+1/-	4 7 3
Yorkshire (West Riding)	1	Nil	Nil	5/-	—	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	6	4	18/9	—	4 5 4
Do. Pref.	1	8	8	31/3	—	5 2 5
Babcock & Wilcox	1	15	14	43/9	—	6 8 0
British Aluminium Ord.	1	10	5	23/9	+1/9	4 4 3
British Insulated Ord.	1	15	15	62/6	+1/-	4 16 0
Brush Ord.	Stock	5	Nil	40	—	—
Callender's	1	15	15	57/6	-1/-	5 4 4
Do. 6½% Pref.	1	6½	6½	27/6	+1/-	4 14 6
Crompton Parkinson Ord.	5/-	30	24	18/9	+1/-	6 7 8
Do. 8% Pref.	1	8	8	30/-	—	5 6 8
Edison-Swan 1st. Pref.	1	7½	7½	23/3	—	6 9 4
Do. 5% Deb.	Stock	5	5	100	—	5 0 0
Electric Construction	1	Nil	Nil	7/6	—	—
Enfield Cable Ord.	1	25	25	4	—	6 5 0
English Electric	1	Nil	Nil	10/9	—	—
Do. do. Pref.	1	Nil	Nil	12/6	—	—
Ever Ready	5/-	35	35	24/6	-3d.	7 2 10
Ferranti Pref.	1	7	7	24/6	—	5 14 3
G.E.C. Pref.	1	6½	6½	28/-	—	4 12 10
Do. ord.	1	10	8	42/6	+6d.	3 15 4
Henley's	1	30	30	5½	—	5 1 1
Do. 4½ Pref.	5	4½	4½	5	—	4 10 0
India-Rubber	1	Nil	Nil	3/9	—	—
Johnson & Phillips	1	10	5	⅞	—	5 14 3
Siemens Ord.	1	7½	7½	23/3	—	6 9 0
Telegraph Construction	12	Nil	Nil	10½	+½	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1930

21848. "Switches adapted to prevent sparking at the terminals." W. C. Sutherland and W. Cauthery. April 20th, 1931. (377206.)

1931

1111. "Apparatus for the telegraphic transmission of visual representations." L. P. Todd. January 13th, 1931. (377187.)

1565. "Electric discharge tubes." S. Ruppel. January 16th, 1931. (377238.)

1566. "Apparatus for the protection of electric conductors against excess voltage." S. Ruppel. January 16th, 1931. (377188.)

2155. "Reduction of unbalance in telephone cables." Standard Telephones & Cables, Ltd., and K. E. Latimer. January 22nd, 1931. (377216.)

7867. "Automatic electric brake for railway trucks." J. R. Scott. March 14th, 1931. (377247.)

8116. "Electric gaseous discharge apparatus." Claude-Lumière Soc. Anon. pour les Applications des Gaz Rares à la Lumière, Procedes G. Claude. November 5th, 1930. (Patent of addition not granted.) (377218.)

8674. "Protective systems for electric circuits." International General Electric Co., Inc. March 20th, 1930. (377219.)

9493. "Automatic gain control devices for use in high-frequency receivers." Marconi's Wireless Telegraph Co., Ltd., G. A. Mathieu, and G. A. Isted. March 28th, 1931. (377307.)

11135. "Electric accumulators." Chloride Electrical Storage Co., Ltd. January 2nd, 1931. (377257.)

11139. "High-frequency electric synchroscope." Communication Patents, Inc. July 25th, 1930. (377211.)

11284. "Electrical condensers." A. Onwood. April 16th, 1931. (377221.)

11312. "Arrangement for giving an inductive signal impulse between train and track apparatus by means of resonance circuits tuned to each other." Vereinigte Eisenbahn-Signal-Werke Ges. November 5th, 1930. (377263.)

11326. "Vacuum tube lighting systems." G. Claude. April 17th, 1930. (377195.)

11602. "Electric tumbler switches." W. G. Gerard. April 20th, 1931. (377197.)

11674. "Electrolytic condensers." Condenser Corporation of America. March 13th, 1931. (377267.)

11696. "Electric switch operating mechanism." British Thomson-Houston Co., Ltd. April 18th, 1930. (377212.)

11697. "Voltage regulation." British Thomson-Houston Co., Ltd. April 19th, 1930. (377213.)

11801. "Apparatus for recording electrical variations." British Thomson-Houston Co., Ltd. April 21st, 1930. (377272.)

11913. "Method of and means for electromagnetically recording acoustic signals." K. Dahmen. April 22nd, 1931. (377276.)

11936. "Electric protective arrangements." British Thomson-Houston Co., Ltd., and P. Matthews. April 22nd, 1931. (377230.)

11955. "Scanning apparatus for use in television picture telegraph and like systems." Marconi's Wireless Telegraph Co., Ltd., H. M. Dowsett, and R. Cadzow. April 22nd, 1931. (377277.)

11956. "Electric glow-discharge tubes." Marconi's Wireless Telegraph Co., Ltd., and F. G. Brett. April 22nd, 1931. (377234.)

11974. "Telephone systems." Automatic Electric Co., Ltd., F. T. Belas, and G. T. Baker. April 22nd, 1931. (377236.)

12119. "Television and like systems and apparatus." G. Bowman and O. G. Hutchinson. April 23rd, 1931. (377283.)

12175. "Electric grid resistances." A. Reyrolle and Co., Ltd., and H. Mordue. April 24th, 1931. (377287.)

12234. "Lighting fittings." Benjamin Electric, Ltd. May 8th, 1930. (377293.)

12279. "Coils for use in wireless receiving apparatus." E. P. Wilson and J. Bate and Co., Ltd. April 25th, 1931. (377297.)

12490. "Terminations or joints for high-tension electric cables." Standard Telephones & Cables, Ltd., T. R. Scott, and J. K. Webb. April 28th, 1931. (377311.)

12566. "Variable electrical resistance devices." Gramophone Co., Ltd., and J. White. April 28th, 1931. (377315.)

12647. "Systems of electrical regulation." British Thomson-Houston Co., Ltd. April 29th, 1930. (377318.)

12914. "Protective arrangements for electrical apparatus." R. O. Kapp, C. G. Carrothers, J. Whitcher, and General Electric Co., Ltd. May 1st, 1931. (377321.)

13557. "Supporting means for thermionic valve systems." Gramophone Co., Ltd., and A. Whitaker. May 7th, 1931. (377329.)

13989. "Connecting means for electric cables." B. Fish. May 12th, 1931. (377339.)

14415. "Electrical heating apparatus." British Electric Transformer Co., Ltd., R. Smith and W. H. Brown. May 15th, 1931. (377345.)

15169. "Electric couplings." General Electric Co., Ltd., and J. R. Conchie. May 22nd, 1931. (377352.)

15847. "Electrical apparatus for the control of stage lighting equipment or the like." E. P. Newton. May 30th, 1931. (377363.)

17463. "Devices for straightening the leading-in wires of electric incandescent lamps and the like." Naamlooze Vennootschap Philips Gloeilampenfabrieken. June 26th, 1930. (377382.)

18422. "Filament supports for tubular electric incandescent lamps and filament arrangements therefor, and methods for the production thereof." M. Deghenghi. June 25th, 1931. (377394.)

18472. "Means for use in the suspension of trucks for tramway and other vehicles." Brush Electrical Engineering Co., Ltd., and A. Peat. June 26th, 1931. (377395.)

18839. "Two-way electric switches." H. J. Bradbury. June 30th, 1931. (377399.)

19081. "Electric lamps." General Electric Co., Ltd., and A. G. Pearce. July 2nd, 1931. (377401.)

19718. "Telephone systems." Ericsson Telephones, Ltd., P. Doig, E. Robinson and B. A. Green. July 9th, 1931. (377407.)

20947. "Systems of electric motor control." British Thomson-Houston Co., Ltd. July 24th, 1930. (377424.)

21686. "Current-impulse transmitter for signalling installations, in particular fire alarm installations." Siemens & Halske Akt.-Ges. July 30th, 1930. (377437.)

21728. "Earthing clips." H. Gresty. July 30th. 1931. (377439.)

22651. "Flywheel magneto apparatus." R. Bosch Akt.-Ges. Sept. 1st, 1930. (377448.)

23254. "Electric speed and frequency indicators." British Thomson-Houston Co., Ltd. Aug. 18th, 1930. (377458.)

23498. "Permanent magnets." N. L. Hurd. Aug. 20th, 1931. (377461.)

23815. "Electromagnetic vibratory devices." Wireless Music, Ltd., F. G. G. Davey and R. E. H. Carpenter. Aug. 24th, 1931. (377467.)

34532. "Automatic controlling devices for oil-cooled electric apparatus." K. Tauber. Sept. 1st, 1930. (377477.)

25787. "Alarm devices for use in connection with telephone systems." L. Huemer. Sept. 14th, 1931. (377489.)

26336. "Means for transmission of an alternating mechanical effort." E.M.S.A., Automatic. Oct. 15th, 1930. (377493.)

1932

137. "Thermionic detector circuit arrangements. Naamlooze Vennootschap Philips Gloeilampenfabrieken. January 16th, 1931. (377559.)

825. "Amplifier and other systems wherein a linear relationship between output and input is required." Telefunken Ges. für Drahtlose Telegraphie. January 9th, 1931. (377563.)

1807. "Electrical warp controlled stopping mechanism for looms." O. Held and H. Held (trading as C. C. Egalhaaf). January 21st, 1931. (377568.)

2114. "Electric switch more especially designed for use in automatically actuated switching apparatus." Landis & Gyr Soc. Anon. January 29th, 1931. (377569.)

3863. "Luminous electric discharge tubes." General Electric Co., Ltd. February 27th, 1931. (377584.)

4522. "Electric glow-discharge lamps." H. Akroyd. February 16th, 1932. (377594.)

5365. "Rotary switch driven by an electric motor." Landis & Gyr Akt.-Ges. March 6th, 1931. (377597.)

5949. "Thermionic amplifying installations." Naamlooze Vennootschap Philips Gloeilampenfabrieken. March 4th, 1931. (377605.)

6815. "Combined electrical gramophone apparatus with wireless receiver in the loudspeaker casing." W. Seidinger. March 7th, 1931. (377610.)

8516. "Electrolytic condensers." International General Electric Co., Inc. March 24th, 1931. (377618.)

9204. "Television apparatus." Marconi's Wireless Telegraph Co., Ltd. April 13th, 1931. (377622.)

9664. "Radio signalling systems for use for navigation and landing aircraft in fog." Telefunken Ges. für Drahtlose Telegraphie. April 2nd, 1931. (377624.)

12495. "Clock controlled operating devices for electric switches. K. Konitzer. April 30th, 1932. (377633.)

13700. "Circuit embodying a screened-grid valve." Naamlooze Vennootschap Philips Gloeilampenfabrieken. May 28th, 1931. (377635.)

13979. "Miners' and garage safety lamps." E. A. Hailwood. March 19th, 1931. (Addition to 276771.) (Divided application on 8396/31.) (377186.)

16306. "Superheterodyne receivers." Naamlooze Vennootschap Philips Gloeilampenfabrieken. June 22nd, 1931. (377639.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from August 10th:—

Chevroc. No. 533093. All goods in Class 6.—The Power Plant Co., Ltd., Horton Bridge, West Drayton, Middlesex.

Acweeco. Nos. 529927 and 529928. All goods in Classes 6 and 8.—The Automatic Coil Winder & Electrical Equipment Co., Ltd., Winder House, 21, Douglas Street, S.W.1.

Magnacore. No. 532938. Class 8. Electric transformers and choke coils.—Henry Nathan Moss, Town End, Portsmouth Road, Kingston-on-Thames.

Shearex. No. 533297. Class 8. Apparatus and parts thereof for use in wireless telegraphy and telephony.—A. E. Shearing, Ltd., 385b, Liverpool Road, N.1.

Pysche (design only). No. 531296. Class 8. Wireless telegraphic and telephonic instruments, electric accumulators (not for medical purposes), electric cables, induction coils, electrical resistances, fitted electrical switchboards, &c.—Pyschon, Ltd., 4, Westminster Palace Gardens, Victoria Street, Westminster, S.W.1.

Sunbeam (lettering and design). No. 532314. Class 8. Primary batteries (not for medical purposes).—The Fuller Accumulator Co. (1926), Ltd., Woodland Works, Chadwell Heath, Essex.

Pertrix. No. 526157. Class 11. Primary batteries and electric accumulators, all for medical purposes.—Britannia Batteries, Ltd., Britannia House, 233, Shaftesbury Avenue, W.C.2.

Metacor. No. 531742. Class 13. Electric junction boxes.—Sykes & Dyson, Ltd., Queen's Mill Road, Huddersfield.

Metram. No. 531766. Class 13. Electric lamps (ordinary).—Nivalight (1928), Ltd., 1, Rosebery Avenue, E.C.1.

Daystar (lettering and design). No. 532049. Class 13. Electric lamps (ordinary).—Century Lamps (London), Ltd., 6, O Building, 89, Upper Thames Street, E.C.4.

Gothic. No. 531901. Class 50. Electric lighting, heating, telegraphic, telephonic and wireless telephonic, telegraphic and television fittings.—Gothic Electrical Supplies, Ltd., 13, Severn Street, Birmingham.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdare (GLAM).—Extensions, Fedw Hir Hospital (£7,500); U.D.C. surveyor.

Ayr.—Cinema (£4,500); W. Ross, 79-81, Prestwick Road.

Beaconsfield (BUCKS).—Houses (40), Amersham Road Estate; J. H. Crosby, U.D.C. surveyor.

Bedlington (NORTHUMBERLAND).—Two schools; Vicar of Bedlington.

Blackpool.—Factory, Devonshire Road, for the Bee Bee Biscuits, Ltd., Sutherland Street; Sir Lindsay Parkinson & Company, Ltd., builders, Talbot Saw Mills.

Bolton.—Rescue station, Worsley, for the Lancashire and Cheshire Coal Owners' Association (£20,000); G. & J. Seddon, builders, 5, Manchester Road, West Little Hulton.

Bournemouth.—Houses (102), Kinson; borough surveyor.

Cambridge.—Cinema and ballroom, Magrath Avenue; D. P. Naylor & Sons, architects; Mr. Sandell, builder.

Cardiff.—Rebuilding of Howell's School, Llandaff; J. Makin, builders, 220, Inverness Place.

Chester.—Four shops, Heath Lane; J. H. Emerson. Improvements to Royalty Theatre; Chester Royalty Theatre Co., Ltd. Restoration of Stanley Palace; Douglas, Minshall & Williams.

Clacton-on-Sea.—Houses (20), Burrs Road, for W. Renshaw.

Colchester (ESSEX).—Alterations and additions to casual wards at Institution for the C.C.; J. Stuart, county architect, County Hall, Chelmsford.

Darlington.—Garages and workshops for the United Automobile Services, Ltd. (£40,000); A. L. Wallis, architect, 20, Victoria Street, S.W.1.

Darwen (LANCS).—Re-erection of machine house, Hollins Paper Mill, for Potter & Co. (£25,000); W. H. Watson, managing director.

Douglas (I. o. M.).—Houses (150), Pulrose Estate; J. E. Teare, borough architect. School, Spring Valley Estate, for the E.C.

Dover.—Telephone repeater station, St. Margaret's Bay; Hammond & Co., builders, Canterbury.

Droylsden.—Houses (244), Sunnybank Lane; J. G. Whitelegg, builders, Washway Road, Ashton-on-Mersey.

Dundee.—R.C. monastery and church, City Road; R.C. Authorities.

Duns (BERWICKSHIRE).—Cinema, South Street, for D. Burns, proprietor of the County Theatre.

Durham.—Extensions to Grammar School, Bishop Auckland; county architect.

Ealing.—Houses (60), Berkeley Avenue; R. Costain & Sons, 7, Norfolk Street, W.C.2. Development of Greenford Estate for Ecclesiastical Commissioners; R. B. Grantham & Son, consulting engineers. Development of Perivale Gardens Village Estate; L. Taylor, architect, Beaconsfield, Bucks. School, Stanhope Street (£13,956); London Construction Co., Hammersmith, W.1.

Eltham.—St. Barnabas Church, with electrical and heating work; T. F. Ford, architect, 35, Finsbury Square, London, E.C.

Essex.—School buildings, Fairlop site (£32,374), and enlargement of Chadwell School, Ilford (£20,000), for the E.C.

Exeter.—Flats for Exeter Workmen's Dwellings Co., Ltd., King Street; city architect.

Falkirk.—Additional ward at the Royal Infirmary (£7,000); D. Kennedy, Hon. Secretary.

Fatfield (DURHAM).—Miners' welfare hall and institute (£6,000); G. Durham & Co., builders, East Boldon.

Fife.—Houses (20), Culross, for the C.C.; clerk, Cupar.

Forest Row (SUSSEX).—Re-erection of electric lighting engine room, Kidbrook Park, for Captain Olof Hambro.

Fort-William.—R.C. church (£20,000); priest-in-charge.

Gillingham.—Shop and showrooms, King Street; Co-operative Society, Ltd.

Glasgow.—Motor repair works at Anniesland for W. McGregor, Beardmore Service and Repair Depôt; T. Allan, architect, 4, Kelvingrove Street, C.3.

Glossop.—Extension of works for Tootal Broadhurst Lee Co., Ltd., Manchester.

Godalming.—Operating theatre, &c., King George V. Sanatorium; L.C.C. architect, County Hall, S.E.

Grange-over-Sands (LANCS).—Hospital block, 1, Westmorland Sanatorium, Meathop; J. Hutton, architect, Kendal.

Guildford.—Pumping station (£7,196); Rice & Son, Margate.

Haddington.—Cinema (700 seats); R. Scott, Tyne House.

Harlesden.—New wing, H. J. Heinz & Co.'s factory.

Harraton Colliery (DURHAM).—Miners' hall and institute (£6,000); G. Durham, builders, East Boldon.

Harrogate.—Covered promenade and bandstand, &c., at Valley Gardens (£22,500), for the Corporation.

Hartlepool.—Houses, Cleveland and Hutton areas; J. H. Miers, architect, Town Hall.

Hastings.—Three-decked parade at St. Leonards-on-Sea (£30,000), for the T.C.

Hereford.—School buildings, Lord Scudamore's and St. Owen's schools, for the E.C.

Herne Bay.—Houses (31), Claremont Street (£9,497); Swift Bros. & Haslam, Ltd., Doncaster. Bank and business premises, High Street and William Street; R. Messenger, architect.

Hexham (NORTHUMBERLAND).—Houses (100); W. Landale, U.D.C. surveyor, Council Chambers.

Houghton-le-Spring.—Alterations and additions to R.C. School (£4,000); T. Rodgers, builder, Valley Street North, Darlington.

Hull.—Shops, Endike Lane Estate; D. Harvey, architect. Extensions to Royal Station Hotel (£80,000); Quibell & Son, Ltd., contractors.

Hutton-le-Hale (YORK).—Church; vicar.

Hyde.—Houses (258); Back Boewer; borough engineer. Workshop, Market Place; Crossleys, Ltd.

Irish Free State.—(DUBLIN).—Alterations at the Female Catholic Hospital, No. 1, James's Street, for the Board of Assistance; Foley & O'Sullivan, architects, 102-3, Grafton Street.

Isle of Axholme.—Water supply scheme, with automatic pumping plant (£57,641), for the R.D.C.; Fairbank & Son, engineers, York.

Keighley.—Depôt buildings, Lawkholme Lane (£1,500); borough engineer.

Kelso (ROXBURGHSHIRE).—Houses (40); burgh surveyor.

Kingswinford (WORCS).—Houses (20) for the R.D.C.; W. Meredith, surveyor.

Lanarkshire.—School, Coatbridge (£18,000), for the C.C.; P. C. Smith, County Buildings, Hamilton.

Leadgate (DURHAM).—Stores extension, Front Street; Co-operative Society, Ltd.

Lincoln.—Houses (40), Boultham; borough surveyor.

Little Thurrock (ESSEX).—Church, Victoria Avenue; Rev. J. C. Nunns, priest in charge of St. John's Church.

Liverpool.—Works and offices, Fearnhill, for Tillotson's (Liverpool), Ltd., Commercial Road, Bootle; Morrison & Sons, Ltd., builders, Grange Terrace, Wavertree.

London.—(ILFORD).—Houses (42), Middleton Gardens; J. Aldridge. Workshop, Bogeys Hill; Ilford Electrical Co. (LEWISHAM).—Houses, Bankhurst Road; Highfield Estate, Ltd. (NORTH WOOLWICH).—Additions to works of R. Silcock & Sons, Ltd., North Woolwich Road, E.16; Simplex Concrete Piles, Ltd., builders, 137, Victoria Street, S.W.1. (ST. MARYLEBONE).—Cumberland Hotel annexe, Bryanston Square; F. J. Wills.

Macclesfield.—Extensions to factory for Smith Brothers (Macclesfield), Ltd., Royal Depôt Mills; J. Clayton, Ltd., builders, Sunderland Street.

Malden (SURREY).—Post office, Malden Road, for H.M. Office of Works, King Charles Street, S.W.1.

Manchester.—Additional works, Trafford Park, for W. T. Glover & Co., Ltd.; Unit Construction Co., Ltd., Pilch Lane, Old Swan, Liverpool. Extensions to works for Wood, Straw & Co., Ltd., Trafford Park; Wellerman Brothers, Ltd., builders, Edward Street, Hyde.

Market Rasen (LINCS).—Houses (36); U.D.C. surveyor.

Morley (YORKS).—Dairy for the Industrial Co-operative Society, Ltd., Albion Street; H. Barraclough & Sons, builders, Victoria Road.

Motherwell.—Hostel and rehousing scheme (£8,300); burgh surveyor.

Newcastle-on-Tyne.—Elementary school (1,260 places), Ferguson Lane, for the E.C.

Newport (I.O.W.).—Stores for Croughers, Ltd., Newport Quay; Stratton & Millgate, architects.

Newport (MONMOUTHSHIRE).—Cinema (2,500 seats) for J. W. Wiffen.

Northampton.—Houses (100), Murray Avenue, &c.; Chowns, Ltd.

North Shields.—Houses (40), Spring Gardens Estate; Ball Bros., builders, Front Street, Preston.

Northwich.—Houses (50), Rudbeath; R.D.C. surveyor.

Ongar (ESSEX).—Houses (190), Doddinghurst; A. H. Stafforth.

Paignton.—Enlargement of Roundham School; C. and R. E. Drew.

Prestwich.—R.C. Church, Boyd Street; R.C. Rural Dean.

Princes Risborough (BUCKS).—Cinema, with electrical work (£13,000), for the Regent Hall & Cinema, Ltd.; A. Noble, builder.

Reading.—Rebuilding of business premises, St. Mary's Butts; Holmes & Sons, St. Mary's Butts. Boys' secondary school, Caversham Grove Estate; director of education.

Ripley (DERBYSHIRE).—Houses (40); Harris Bros., U.D.C. builders.

Romford (ESSEX).—Additions and alterations to police station; J. Stuart, county architect, County Hall, Chelmsford.

Ryhope.—Automatic telephone exchange, Durdon Lane; Post Office Engineering Department.

Selby.—Extension of the Hospital; hon. secretary.

Sheffield.—Three shops, Ecclesfield Road; Rhodes and Mitchell.

Shrewsbury.—Extensions to County Offices (£4,925); Treasure & Sons, Ltd.

Southend-on-Sea.—Installation of heating apparatus on Pier Pavilion for the T.C.

Southport.—Buildings for the Co-operative Wholesale Society, Ltd., London Street; Architects' Department, C.W.S., Balloon Street, Manchester.

South Shields.—Houses, West Park Lane (50) and Green Lane (72); borough engineer.

Stretford.—Weaving shed, Texilose Road; Texilose Manufacturing Co., Ltd.

Sunderland.—Rebuilding of Messrs. Binn's premises (£14,000); D. and J. Ranken, builders, Stockton Road.

Swinton and Pendlebury (LANCS).—Senior and junior schools, for the E.C.; W. Chasen Ralph & Sons, architects, Leaders Buildings, King Street, Wigan.

Swindon (WILTS).—Houses (142) and bungalows (30), Hurst Estate; J. B. L. Thompson, borough surveyor.

Sydenham.—Houses (28), Westwood Park; H. Macintosh.

Torquay.—Telephone exchange, Chelston, for H.M. Office of Works, King Charles Street, S.W.1.

Tweedmouth.—Premises for the Industrial Co-operative Wholesale Society; C.W.S. architects' department.

Wallasey.—School, Moreton; Catholic trustees.

Walsall.—Hotel and shops, George Hotel site (£48,000); borough engineer.

Waltham Abbey.—War Memorial Hospital extensions, including X-ray ward; W. T. E. Duncan, builder.

Warlingham (SURREY).—Houses (20), Ridley Road; Miss M. Ulrik, Homefield Road.

Warwick.—Carpet factory, Packmores Estate, for the Warwick Carpet Co., Ltd.

West Riding.—Infants' school, Bingley; education officer, County Hall, Wakefield.

Wilton (WILTS).—Senior school for C.O.E. Managers; correspondent.

Workington.—Houses (22); J. Penman, surveyor, Town Hall.